

# ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2014

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## HEARINGS BEFORE A SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES ONE HUNDRED THIRTEENTH CONGRESS FIRST SESSION

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### SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

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### PART 7

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**PART 7—ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2014**

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## **ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2014**

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THURSDAY, APRIL 11, 2013.

### **NUCLEAR WASTE PROGRAMS AND STRATEGIES**

#### **WITNESSES**

##### **Panel 1:**

**PETER B. LYONS, ASSISTANT SECRETARY FOR NUCLEAR ENERGY, DEPARTMENT OF ENERGY**

**MICHAEL WEBER, DEPUTY EXECUTIVE DIRECTOR FOR MATERIALS, WASTE, RESEARCH, STATE, TRIBAL, AND COMPLIANCE PROGRAMS, NUCLEAR REGULATORY COMMISSION**

##### **Panel 2:**

**FRANK RUSCO, DIRECTOR OF NATURAL RESOURCES AND ENVIRONMENT ENERGY AND SCIENCE, GOVERNMENT ACCOUNTABILITY OFFICE**

**SUSAN EISENHOWER, FORMER MEMBER, BLUE RIBBON COMMISSION ON AMERICA'S NUCLEAR FUTURE**

**RODNEY C. EWING, CHAIRMAN, NUCLEAR WASTE TECHNICAL REVIEW BOARD**

Mr. FRELINGHUYSEN. The hearing will come to order. Thank you all for being here promptly.

The purpose of today's hearing is to discuss the Administration's activities and proposals to address our nation's nuclear waste. I would like to welcome our first panel of witnesses, Dr. Peter Lyons. Welcome back. I looked over your resume, and may I say you have worked for the Department of Energy for over 50 years.

Mr. LYONS. Thank you, sir.

Mr. FRELINGHUYSEN. Lots of testimony. Thank you for being front and center before us today.

I would also like to welcome Mr. Michael Weber from the Nuclear Regulatory Commission. He is a deputy executive for Operations. Thank you for being here.

Mr. WEBER. Nice to be here.

Mr. FRELINGHUYSEN. After we hear from these witnesses about the Administration's current activities and proposals and have a chance to question them fully, we will have a second panel to provide us with some perspectives from outside the Administration. That second panel will include Mr. Frank Rusco, Director of Natural Resources and Environment for the GAO, Government Accountability Office. Ms. Susan Eisenhower, former member of the Blue Ribbon Commission (BRC). Thank you for being here. Dr. Rodney Ewing, chairman of the Nuclear Waste Technical Review Board will make up the second panel.

I do not need to dwell on the fact that nuclear waste has been a very controversial issue between Congress and the Executive Branch. Yucca Mountain will not be the sole focus of this hearing but it will underline many of your questions. It will continue to provide the backdrop for congressional evaluation of any new proposals, including those before us today. It will continue to erode trust, not only between branches of the federal government, but also between the Executive Branch and local communities seeking to host additional sites. And it will be the lens through which the credibility of the Nuclear Regulatory Commission is viewed. We will provide a fair hearing today and it will be fair because we will incorporate Yucca Mountain into our discussions, not because we ignore it.

The Administration's latest proposals to address nuclear waste appear to be a little more than a blueprint for dialogue to get us past Yucca Mountain. And no wonder—the Administration, and we as a nation, are faced with some very uncomfortable facts. For one, the longer this nation goes without taking responsibility for spent fuel, the higher the bill is to the federal taxpayer. At this point, liabilities are likely to be near \$20 billion, in addition to billions already paid. This liability is directly and entirely caused by the Administration's Yucca Mountain policy. In addition, the Administration's arguments in court that Congress has failed to provide funding to support the application at the NRC are patently disingenuous at best. I can indeed understand the Administration's desire to have the Yucca Mountain repository disappear from public view but it is not going to disappear from public view. And I think that is the general consensus of both the House Republicans and Democrats.

The future of nuclear waste will be built on substantive decisions—how to provide funding, and what sort of organization should manage the waste and the facilities among them. These decisions will take time and deliberation and many hearings. In addition to this one I must make it clear that we are holding this hearing in the hopes that the Administration will find a path forward to fulfill its legal requirements regarding Yucca. The Administration's attempts to shutter the Yucca Mountain program have already killed attempts to make construction progress on other solutions. Let us hope that this unfortunate situation will soon come to an end.

We have many witnesses to hear from today, and I want to thank all of them for being here and for their substantive testimony which we have in front of us. So I welcome all the panelists. Before that I just want to recognize that Joe Levin, who is to my right, who has this as his portfolio, will be leaving the Committee after a number of years of service, both to the minority under former Chairman Pete Visclosky, and now as my chair on the Committee. He has served both of our parties and our nation well. Of course, he goes to the dark side, to the Department of Energy. But we know that he will do a great job there as well, and he will go there obviously with our thoughts and prayers and our knowledge of all that we hold to our heart.

So with those comments, Joe, good luck to you, and I am happy to yield to Ms. Kaptur for any comments she may have.  
[The information follows:]

**Opening Statement  
Chairman Frelinghuysen  
Oversight Hearing on Nuclear Waste Programs  
April 11, 2013**

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The hearing will come to order. The purpose of today's hearing is to discuss the Administration's activities and proposals to address this country's nuclear waste.

I'd like to welcome our first panel of witnesses. Dr. Lyons, Assistant Secretary for Nuclear Energy, it's good to see you again. And Mr. Weber, the Nuclear Regulatory Commission's Deputy Executive for Operations for Materials, Waste, Research, State, Tribal and Compliance Programs, welcome to your first appearance before the subcommittee.

After we hear from these two witnesses about the Administration's current activities and proposals, and have a chance to question them fully, we will have a second panel to provide us with some perspectives from outside the Administration: Mr. Frank Rusco, Director of Natural Resources and Environment for the Government Accountability Office; Ms. Susan Eisenhower, former Member of the so-called "Blue Ribbon Commission", and Dr. Rodney Ewing, Chairman of the Nuclear Waste Technical Review Board.

I don't need to dwell on the fact that nuclear waste has been a controversial issue between Congress and the Executive Branch. Yucca Mountain will not be the sole focus of this hearing, but it will underlie many of our questions. It will continue to provide the backdrop for Congressional evaluation of any new proposals, including those before us today. It will continue to erode trust not just between the branches of federal government, but also between the executive branch and local communities seeking to host additional sites. And it will be the lens through which the credibility of the Nuclear Regulatory Commission is viewed. We will provide a fair hearing today, and it will be fair because we will incorporate Yucca Mountain into our discussions – not because we ignore it.

At about 17 pages, the Administration's latest proposals to address nuclear waste are little more than a blueprint for dialogue to get past Yucca Mountain. And no wonder – the Administration is faced with some very uncomfortable facts. For

one, the longer this nation goes without taking responsibility for spent fuel, the higher the bill is to the federal taxpayer. At this point, liabilities are likely to be nearly \$20 billion, in addition to the billions already paid. This liability is directly and entirely caused by the Administration's Yucca Mountain policy. IN addition, the Administration's arguments in court that Congress has failed to provide funding to support the application at the NRC are patently disingenuous at best. I can indeed understand the Administration's desire to sweep Yucca Mountain under the rug.

The future for nuclear waste will be built upon weighty decisions— how to provide funding, and what sort of organization should manage the waste and the facilities among them. These decisions will take time and deliberation and many hearings in addition to this one. I must make clear that we are holding this hearing in the hopes that the Administration will find a path forward to fulfill its legal requirements regarding Yucca Mountain. The Administration's attempts to shutter the Yucca Mountain program have already killed attempts to make constructive progress on other solutions — let us hope this unfortunately situation will soon come to an end.

I'll keep my remarks short — we have many witnesses to hear from today. So, once again, welcome to our panelists, and I now turn to the Ranking Member for any comments she may have.

Ms. KAPTUR. Thank you, Mr. Chairman. And let me also extend my very best wishes to Joe and thank him for his service to our country and his service to this very important Subcommittee.

Good morning. I would like to welcome our first panel in today's hearing. Dr. Lyons and Mr. Weber are representing the Department of Energy and the Nuclear Regulatory Commission, respectively.

The programs related to nuclear waste at the Department of Energy and the NRC impact many regions of our country, and in particular those including my own district where nuclear power plants are or were in operation. The government must live up to its responsibility and provide for the eventual safe disposal of commercial spent fuel that is currently stored at the sites. Further, the government has an obligation to safely package and store the high-level radioactive waste generated by the Nuclear Weapons Program.

In the wake of the administration's decision to terminate Yucca Mountain, the nation does not currently have a solution to this pressing problem. We have spent enormous amounts of money on Yucca and what do we have to show for that investment? I hope the panelists will help answer that question today.

In January, the Department of Energy outlined its new strategy for the management and disposal of this waste based on the work done by the Blue Ribbon Commission. This strategy outlines the administration's new approach to disposal of this waste, one in which we appear to be essentially starting from scratch.

With the second panel, we will hear from Mr. Rusco representing the GAO; Ms. Eisenhower, who served on the Blue Ribbon Commission; and Dr. Ewing with the Nuclear Waste Technical Review Board. I look forward to the insights that this panel can give from a perspective outside the programs managed by the DOE and the NRC. Thank you, Mr. Chairman, for this time.

Mr. FRELINGHUYSEN. Thank you, Ms. Kaptur.

Dr. Pete Lyons, thanks for being with us. We welcome your testimony.

Mr. LYONS. Thank you, sir.

Chairman Frelinghuysen, Ranking Member Kaptur, and members of the Subcommittee, it is again an honor to meet with you. In my testimony a month ago, I noted the vital role of nuclear power in the nation's clean energy portfolio and the administration's support for it. I also noted our research and development roadmap that we published in April of 2010, wherein four goals were highlighted. One of those, to demonstrate progress towards a sustainable fuel cycle is the subject of this hearing. Significant progress on this challenge, in my view, is vital to assure the future viability of U.S. nuclear power.

In 2010, the secretary established the Blue Ribbon Commission on America's Nuclear Future to conduct a comprehensive review of policies for managing the backend of the nuclear fuel cycle, and that Commission issued its final report in January of 2012.

In January 2013, the Department released the administration's Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste, which endorsed key principles of the Commission's report. The strategy represents administra-

tion's policy to emphasize the importance of addressing the disposition of used nuclear fuel and high-level rad waste. It also represents a base for discussions among the administration, Congress, and other stakeholders on a path forward. In the meantime, we are undertaking activities within existing authorizations to plan for transportation, storage, and disposal of used nuclear fuel.

Subject to legislation, the strategy lays out plans to implement a program over the next 10 years that begins operation of a pilot interim storage facility in 2021, advances towards the siting and licensing of a larger interim storage facility by 2025, and makes demonstrable progress towards a geologic repository.

The strategy notes that some or all of these facilities could be colocated, and all could accept defense waste in addition to commercial used fuel. The strategy also fully endorses the need for consent-based siting and highlights the need for a new waste management and disposal organization to provide the stability, the focus, and the credibility to build public trust and confidence.

Consistent with the strategy, the president's Fiscal Year 2014 budget request announced yesterday includes three new proposals to move ahead with developing the nation's used nuclear fuel and high-level waste management system. First, it lays out a comprehensive funding reform proposal, including three elements for funding reform. First is ongoing discretionary appropriations. Second is reclassification of spending. And third is access to the balance of the Nuclear Waste Fund when needed.

The administration supports an ongoing role for the Appropriations Committees to provide vital mission oversight. Therefore, the ongoing discretionary appropriations are proposed in amounts up to \$200 million per year, starting at modest levels in the near term and increasing as planning, management, and regulatory activities increase. In addition to these amounts, the proposal includes mandatory spending beginning in 2017 of the Nuclear Waste Fund for amounts needed above 200 million; amounts that would be needed to pay for the design and construction of storage facilities, as well as to execute a robust siting process for a geologic repository. This proposal balances access to the fees dedicated to the nuclear waste mission with oversight from Congress and the Executive Branch.

Second, for the first time the budget baseline reflects a more complete estimate of potential future costs of the liability associated with continuing to pay utilities based on the government's liability for partially breaching its contract to dispose of used nuclear fuel. The cost of the government's growing liability for partial breach of contracts with nuclear utilities is, as you know, paid from the Judgment Fund. While payments are extensively reviewed by the Department of Energy and must be authorized by the Attorney General prior to disbursement by the Treasury, as mandatory spending, they are not subject to OMB or congressional approval. Past payments are included in full in the budget, but until now the budget has included only a partial estimate of the potential future cost of continued insufficient action. To improve budget projections, the baseline for the Judgment Fund in this budget reflects a more complete estimate of potential future costs of these liabilities. By reflecting a more complete estimate of the liability payments in the baseline, costs over the life of the Nuclear Waste Management and

Disposal Program would eventually be offset for the purposes of scoring against the baseline by reductions in liabilities as the government begins to pick up sufficient waste from commercial sites.

And third, the president's budget includes funding and authority for the EPA to begin revision of generic disposal standards to support the siting of used fuel and high-level waste facilities. The administration agrees with the Blue Ribbon Commission that generally applicable regulations are more likely to early public confidence than site-specific standards and a generic standard will support the efficient and equitable consideration of multiple sites.

The administration looks forward to working with the Subcommittee and other members on crafting a path forward for used nuclear fuel and high-level waste management and disposal. This progress is critical to assure that the benefits of nuclear power are available to current and future generations. And I will look forward to your questions.

[The statement of Mr. Lyons follows:]



**Statement of Peter Lyons**  
**Assistant Secretary for Nuclear Energy**  
**U.S. Department of Energy**  
**Before the**  
**Subcommittee on Energy and Water Development, and Related Agencies**  
**Committee on Appropriations**  
**U.S. House of Representatives**  
**April 11, 2013**

The United States, like all countries, faces challenges associated with ensuring its people have access to affordable, abundant, and environmentally friendly sources of energy. President Obama continues to make addressing climate change a priority and the Administration has set a goal of reducing carbon emissions by 80 percent by 2050. Nuclear power can play an important role in achieving this goal. As the President noted in Korea last spring, "in the United States, we've restarted our nuclear industry as part of a comprehensive strategy to develop every energy source."

Nuclear power has reliably and economically contributed almost 20 percent of electrical generation in the U.S. over the past two decades. It remains the United States' single largest contributor (more than 60 percent) of non-greenhouse-gas-emitting electric power generation. Currently, we have five new commercial nuclear reactors under construction, including four AP1000 reactors which are passively safe nuclear plants.

The United States must develop a used nuclear fuel management and disposal strategy to ensure that nuclear power continues to be a safe, reliable resource for our nation's long-term energy supply and security. Because acceptance of used nuclear fuel did not begin in 1998, as mandated by the Nuclear Waste Policy Act, a substantial cost has been presented to the taxpayers to reimburse utilities for the cost of ongoing storage that are directly related to this delay.

**Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste**

Finding a solution to managing and disposing the nation's high-level radioactive waste and used nuclear fuel is a long-standing challenge. Such a solution, however, is necessary to assure the future viability of an important carbon-free energy supply and further strengthen America's standing as a global leader on issues of nuclear safety and nonproliferation.

In FY 2010, the Secretary of Energy established the Blue Ribbon Commission on America's Nuclear Future (BRC, or the Commission) composed of experts from government, academia and industry. The charter charged the Commission with conducting a "comprehensive review of policies for managing the back end of the nuclear fuel cycle, including all alternatives for the storage, processing, and disposal of civilian and defense used nuclear fuel, high-level waste, and materials derived from nuclear activities... [and to] provide advice, evaluate alternatives, and make recommendations for a new plan to address these issues." The Commission issued its final report on January 26, 2012.

In January 2013, the Department released the Administration's *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste*, which endorses key principles of the Commission's report. The Strategy lays out plans to implement, with the appropriate authorizations

from Congress, a long-term program that begins operations of a pilot interim storage facility by 2021, advances toward the siting and licensing of a larger interim storage facility by 2025, and makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048.

The Strategy addresses several important needs. First, it serves as a statement of Administration policy regarding the importance of addressing the disposition of used nuclear fuel and high-level radioactive waste; it lays out the overall design of a system to address that issue; and it outlines reforms needed to implement such a system. Second, it presents the Administration's response to the final report and recommendations made by the BRC. It also responds to direction in the Joint Explanatory Statement accompanying the Consolidated Appropriations Act, 2012, to develop a strategy for the management of used nuclear fuel and nuclear waste in response to the BRC's recommendations. Third, this strategy represents an initial basis for discussions among the Administration, Congress and other stakeholders on a sustainable path forward for disposal of nuclear waste.

As noted, the Administration's Strategy endorsed the concept of the development of three different, but intimately related, facilities. While the Strategy indicates one of each of three separate facilities and sites, it is conceivable, as the result of a consent-based siting process, that some or all of these facilities could be co-located and/or more than one of each type could be constructed. First, consistent with legislation recently under consideration in Congress, the Administration supports the development of a pilot interim storage facility with an initial focus on accepting used nuclear fuel from shut-down reactor sites. Acceptance of used nuclear fuel from shut-down reactors provides a unique opportunity to build and demonstrate the capability to safely transport and store used nuclear fuel, and therefore to make progress on demonstrating the federal commitment to addressing the used nuclear fuel issue. In addition, a pilot facility could also take defense wastes to demonstrate commitment and progress in addressing the legacy of the Cold War. A pilot would also build trust among stakeholders with regard to the consent-based siting process and commitments made with a host community for the facility itself, with jurisdictions along transportation routes, and with communities currently hosting at-reactor storage facilities.

Second, beyond a pilot-scale facility, the Administration supports the development of a larger consolidated interim storage facility with greater capacity and capabilities that will provide flexibility in operation of the transportation system and disposal facilities. A larger-scale facility could take possession of sufficient quantities of used nuclear fuel to make progress on the reduction of long-term contractual liabilities and could also accept defense wastes.

Finally, there is international consensus that geologic repositories represent the best known method for permanently disposing of used nuclear fuel and high-level radioactive waste, without putting a burden of continued care on future generations. The Administration agrees that the development of geologic disposal capacity is currently the most cost-effective way of permanently disposing of used nuclear fuel and high-level radioactive waste while minimizing the burden on future generations. As noted by the BRC, the linkage between storage and disposal is critical to maintaining confidence in the overall system. Therefore, efforts on implementing storage capabilities within the next 10 years will be accompanied by actions to engage in a consent-based siting process and begin to conduct preliminary site investigations for a geologic repository.

No matter how many facilities or what specific form they take, a consent-based approach to siting is critical to success. The Administration supports working with Congress to develop a consent-based

process that is transparent, adaptive, and technically sound. The BRC emphasized that flexibility, patience, responsiveness and a heavy emphasis on consultation and cooperation will all be necessary in the siting process and in all aspects of implementation. Experiences in other countries indicate that a consent-based process – developed through engagement with states, tribes, local governments, key stakeholders, and the public – offers a greater probability of success. For example, Sweden and Finland have successfully executed programs to select a site among multiple volunteers. Others such as France, Switzerland, and Canada, have programs underway that appear to be demonstrating some success. DOE is currently evaluating critical success factors in the siting of nuclear facilities in the U.S. and abroad to facilitate the development of a siting process.

The strategy highlights the need for a new waste management and disposal organization to provide the stability, focus, and credibility to build public trust and confidence. Again, there are multiple models that exist along a continuum from a government program to federal corporations – entities that report to a cabinet secretary and those that have their own board of directors that report independently to the President. A study commissioned by DOE and conducted by RAND Corporation found that a government corporation and an independent government agency are two models that appear workable for waste management. Whatever form the new entity takes, organizational stability, an appropriate level of autonomy, leadership continuity, oversight and accountability, and public credibility are critical attributes for future success. Further, the authorities and responsibilities of the new organization are more important than the specific form. The Administration will work with Congress to ensure that the authorization of any new body established for this purpose provides adequate authority and leadership as well as appropriate oversight and controls.

The Administration also recognizes that providing adequate and timely funding is critical to the success of the nuclear waste mission. The Strategy proposes a funding program that contains three critical elements: discretionary appropriations within existing spending caps to pay for regular and recurring activities; legislative reclassification of annual fee income from mandatory to discretionary or a direct mandatory appropriation to make dedicated funds available in sufficient amounts without competing with other government priorities; and eventual access to the existing balance of the Nuclear Waste Fund in the Treasury. Within this approach are many variations that we believe can achieve the needed balance between adequate and timely access to funds and oversight and accountability by Congress and the Executive branch. It should be noted that this proposal does not fund licensing activities for the previous geologic disposal program. Whether discretionary or mandatory spending is ultimately approved, this approach is not a “blank check” for waste management activities and we look forward to working with Congress on crafting a meaningful approach.

Full implementation of this program will require legislation to enable the timely deployment of the system elements noted above. The Administration has put forward a comprehensive proposal, but is also committed to working with Congress on the specifics of this important issue. In the meantime, the Administration, through NE, is undertaking activities within existing Congressional authorizations to plan for the eventual transportation, storage, and disposal of used nuclear fuel.

#### **Ongoing Activities**

The Blue Ribbon Commission noted the need for near-term actions that can lay the groundwork for the next generation of nuclear waste policies and programs. It included in its recommendations:

- Continuation of a research and regulatory oversight effort in used fuel and storage system degradation phenomena, vulnerability to sabotage and terrorism, and others.
- Moving forward with geologic disposal through valuable, non-site specific activities, including R&D on geological media, work to design improved engineered barriers, and work on the disposal requirements for advanced fuel cycles.
- Development of a research, development, and demonstration plan and roadmap for taking the borehole disposal concept to the point of a licensed demonstration.
- Performance of system analyses and design studies needed to better integrate storage into the waste management system, including standardization of dry cask storage systems and development of a conceptual design for a spent fuel storage facility.
- Development of a database to capture the experience and knowledge gained from previous efforts to site nuclear waste facilities in the United States and abroad.
- Completion of policies and procedures for providing technical assistance funds to states, tribes, and local jurisdictions which are likely to be traversed by transportation shipments.

DOE is currently undertaking activities to address these recommendations. For example, DOE is working with industry to conduct R&D (lab, field, and modeling) to further develop the technical bases for continued safe storage. Specifically, a key element of the storage R&D is to implement, on a cost-sharing basis with industry, a full scale storage demo project focused on getting full scale, field information on the long term storage of high burn-up fuel. This demo project is in the final steps of the DOE procurement process, and the contract should be awarded by the end of this month. The initial output will be a test plan, to be put forth for public comment, which will within a few years lead to a more highly instrumented storage system than that which is typical at a utility site, using the utility's fuel, under the utility's NRC license.

DOE is also working to analyze the capabilities of various geologic media that had not been looked at since the decision to focus on Yucca Mountain. This will help show that there is a sound technical basis for disposal in the US in different geologic media, and will help provide confidence in whatever future decisions are made. DOE is taking advantage of existing analysis related to different geologic settings at disposal sites in other countries to help leverage expertise and minimize costs.

With regard to borehole disposal, DOE is developing a draft plan and roadmap for a deep borehole demonstration project. The demonstration would evaluate the safety, capacity, and feasibility of the deep borehole disposal concept for the long-term isolation of nuclear waste. It would serve as a proof of principle, but will not involve the disposal of actual waste. The demonstration would evaluate the feasibility of characterizing and engineering deep boreholes, evaluate safe processes and operations for safe waste emplacement and evaluate geologic controls over waste stability.

In FY 2012, DOE initiated system-level analyses for the overall interface between at-reactor, consolidated storage and disposal, including the development of supporting logistic simulation tools to better understand aging of fuel, loading requirements, and opportunities for use of standardized canisters. In addition, DOE acquired services of industry to develop design concepts for an interim storage facility and is evaluating their submissions in FY 2013.

A database on experiences with siting radioactive materials facilities both in the U. S. and abroad has been developed that will be a public resource and will inform the planning process. A report on the findings of the initial studies and an examination of case studies in the data base of siting experience is being prepared and will be available this summer. Consistent with the BRC's report, social science studies are being conducted to assess public attitudes towards aspects of siting and transporting radioactive materials, changes in public perception over time, and drivers for any changed perceptions.

For transportation planning and engagement with stakeholders, DOE has convened a Working Group under the auspices of the National Transportation Stakeholders Forum (NTSF - comprised of Federal, State, and Tribal governmental representatives) to address training-related issues and develop a revised policy for preparing public safety officials along proposed transportation routes, as required by Section 180(c) of the Nuclear Waste Policy Act. The Working Group will analyze and, when possible, make recommendations on specific issues related to Section 180(c) policy and implementation.

#### **The President's Fiscal Year 2014 Budget Request**

The President's FY 2014 budget request includes a multi-part proposal to move ahead with developing the nation's used nuclear fuel and high-level waste management system outlined in the Administration's Strategy. First, it lays out a comprehensive funding reform proposal. As described in the Strategy, the Administration's proposal includes three elements for funding reform: ongoing discretionary appropriations, reclassification of existing annual fees from mandatory to discretionary or a direct mandatory appropriation, and access to the balance of the nuclear waste fund. Included in the amounts that would be made available under this proposal, are defense funds to pay for the management and disposal of government-owned wastes within the overall system.

The Administration believes an ongoing role for the Appropriations Committees of Congress is a key component of oversight of the waste management mission going forward. Therefore, ongoing discretionary appropriations within existing funding caps are included in the proposal in amounts up to \$200 million per year, starting at modest levels in the near term and increasing as planning, management, and regulatory activities increase. In addition to these amounts, the proposal includes access to amounts needed above \$200 million to pay for the design and construction of storage facilities as well as execute a robust siting process for a geologic repository.

In total, the Administration proposes \$5.6 billion in spending to implement the strategy over the next 10 years. Up to \$1.8 billion of this would be within existing spending caps, while the remaining \$3.8 billion would be funding from the Nuclear Waste Fund's annual fees, use of balance of the Nuclear Waste Fund, and defense funds. To offset the "pay-as-you-go" score, the government intends to accept used nuclear fuel from shutdown reactors within the 10-year budget window, triggering payment of one-time fees owed the government from utility contract holders in the amount of approximately \$2.5 billion. This results in a net score of approximately \$1.3 billion. The proposal balances access to the fees dedicated to the nuclear waste mission with oversight from Congress and the Executive branch, while supporting implementation of a system with achievable goals.

Second, for the first time, the Budget baseline reflects a more complete estimate of potential future costs of the liability associated with continuing to pay utilities based on the Government's liability for partially breaching its contract to dispose of used nuclear fuel. The cost of the Government's growing liability for partial breach of contracts with nuclear utilities is paid from the Judgment Fund of the U.S. Government. While payments are extensively reviewed by Department of Energy, and must be authorized by the Attorney General prior to disbursement by the Department of the Treasury, as mandatory spending they are not subject to Office of Management and Budget or Congressional approval. Past payments are included in full in the Budget, but until now the Budget has included only a partial estimate of the potential future cost of continued insufficient action. To improve budget projections, the baseline for the Judgment Fund in this Budget reflects a more complete estimate of potential future cost of these liabilities. By reflecting a more complete estimate of the liability payments in the baseline, costs over the life of the nuclear waste management and disposal program would eventually be offset (for the purposes of scoring against the baseline) by reductions in liabilities as the Government begins to pick up sufficient waste from commercial sites.

Third, the President's budget includes funding for the Environmental Protection Agency (EPA) to begin the review and update of generic (non-site specific) disposal standards to help guide the siting of used fuel and high-level waste facilities. Current EPA standards for all sites other than Yucca Mountain are defined under 40 CFR Part 191, "Environmental Radiation Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," and were last updated in 1993. The Administration agrees with the BRC that generally applicable regulations are more likely to earn public confidence than site-specific standards. In addition, having an updated generic standard will support the efficient consideration and examination of multiple sites.

Finally, in FY 2014, DOE, through the Office of Nuclear Energy, will support the *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Waste* by funding activities to lay the ground work for the design of an integrated waste management system as well as related research and development work. Specifically, in the used nuclear fuel research and development area, the Department will work with industry on conducting investigations into the extended storage of used nuclear fuel and the transport of such fuel under a range of cask loadings. In addition, ongoing research into alternative disposal environments, including modeling, experiments, and field tests will be continued, with a particular emphasis on salt. Finally, the Used Fuel Disposition program will undertake R&D activities to further the understanding of hydro-geochemical, physical geology, structural geology, geophysical state and engineering properties of deep crystalline rocks for deep borehole disposal.

In the management and disposal system design area, DOE will conduct system architecture and operating evaluations of various used fuel management systems, including centralized and/or regional storage facilities, various repackaging scenarios and acceptance rates. DOE will also update transportation and storage system models, and develop cost databases. Further, DOE will conduct analyses for initial used fuel shipments from shutdown reactor sites: including staffing, routing, procurement, operations, security, quality assurance, emergency response, training, logistics, site

servicing, mobilization, operational readiness, and site servicing schedules. Work will also continue on an evaluation of standardized containers for storage, transportation, and potentially disposal. Outreach activities to stakeholders on transportation planning and issues will also continue.

**Closing**

The Administration looks forward to working with this Subcommittee and other members of Congress on crafting a path forward for used nuclear fuel and high-level waste management and disposal. This progress is critical to assure that the benefits of nuclear power are available to current and future generations.

Mr. FRELINGHUYSEN. Thank you, Dr. Lyons.

Mr. Weber, good morning. Thank you for being with us.

Mr. WEBER. Good morning, Chairman Frelinghuysen and Ranking Member Kaptur and other distinguished members of the Subcommittee. I appreciate the opportunity to discuss the regulatory program for high-level radioactive waste management at the U.S. Nuclear Regulatory Commission.

In my testimony today, I will highlight NRC's mission to protect the public health and safety, promote the common defense and security, and protect the environment, and our current work related to the orderly closure of the Yucca Mountain Review, Waste Confidence, and ensuring the safety and security of spent nuclear fuel and ultimate disposal in a geologic repository.

The agency completed the orderly closure of our licensing review of the proposed repository at Yucca Mountain by the end of Fiscal Year 2011. We documented and published in this series of documents and in others the results of the NRC's review. This stack represents one volume of the Safety Evaluation Report and three volumes of the Technical Evaluation Report. Additionally, we developed over 40 other documents to describe the status of the technical review at the time the staff suspended that review. In September 2011, the Atomic Safety and Licensing Board completed all necessary and appropriate case management activities associated with the hearing process. And since the closure of our review activities, the NRC has continued to close out contracts and recoup additional funds, making them available from the previous carryover amount. As a result, the NRC today has about \$11.1 million in unobligated carryover money and about \$2.5 million in obligated unexpended money from the Nuclear Waste Fund. No additional funds from the Nuclear Waste Fund were appropriated to the NRC to perform any additional work related to Yucca Mountain in Fiscal Years 2012 and 2013.

The agency's actions to close the review of Yucca Mountain and the license application review have been challenged in the D.C. Circuit Court of Appeals. In August 2012, the D.C. Circuit issued an order holding the case in abeyance pending decisions on appropriations for Fiscal Year 2013. With the recent passage of those appropriations, the parties in the case have since advised the Court that no additional funds related to Yucca Mountain have been appropriated for either the NRC or the Department of Energy. We are awaiting a decision at this time from the Court.

Regarding Waste Confidence, my second topic, the Waste Confidence decision represents the Commission's generic finding regarding the environmental impacts of continued storage of spent nuclear fuel after the end of the licensed operation of a nuclear power plant and prior to the ultimate disposition or disposal of that fuel in a permanent repository. Last year, the D.C. Circuit Court identified three aspects of the Waste Confidence decision that required additional consideration under the National Environmental Policy Act. In response to the Court's decision, the Commission directed the NRC staff to prepare by September 2014 a Generic Environmental Impact Statement that focuses on those deficiencies that were identified in the D.C. Circuit Court decision. The Commission also directed the staff to prepare a revised temporary storage rule,



and that all affected license application reviews will continue. The agency will not issue final licenses dependent on Waste Confidence until these issues have been addressed.

We recently completed the scoping process for the environmental impact statement on Waste Confidence and issued a scoping summary report in early March. We have extensively engaged the public in the process, holding more than six public meetings so far, distributing documents to hundreds of interested stakeholders, and assessing over 1,700 comments on the proposed scope of the impact statement. We expect the draft generic environmental impact statement to be available for public comment later this year, and we are committed to completing that statement and the Temporary Storage Rule in an effective, efficient, timely, and open manner.

And finally, and most importantly, the agency ensures daily that nuclear fuel is stored, handled, and transported safely and securely through our comprehensive regulatory program that includes licensing, oversight, rulemaking, research, incident response, and international cooperation. The NRC staff regularly inspects spent fuel pools and dry cask storage facilities, and we are soliciting comments from stakeholders and refining our regulatory processes for spent fuel storage and transportation to enhance their effectiveness and their efficiency. In addition, we are cooperating with the Department of Energy, with the industry, international regulatory counterparts, and other interested stakeholders to identify, assess, and resolve safety, security, safeguards, and environmental issues associated with storage, transportation, and disposal of spent fuel.

Chairman Frelinghuysen, Ranking Member Kaptur, and distinguished members of the Subcommittee, thank you for the opportunity to appear before you today, and I would be pleased to respond to your questions.

[The statement of Mr. Weber follows:]

**WRITTEN STATEMENT**

**BY MICHAEL WEBER, DEPUTY EXECUTIVE DIRECTOR FOR  
MATERIALS, WASTE, RESEARCH, STATE, TRIBAL, AND COMPLIANCE PROGRAMS,  
UNITED STATES NUCLEAR REGULATORY COMMISSION**

**TO THE**

**HOUSE COMMITTEE ON APPROPRIATIONS  
SUBCOMMITTEE ON ENERGY AND WATER**

**APRIL 11, 2013**

Good morning, Chairman Frelinghuysen, Ranking Member Kaptur, and distinguished members of the Subcommittee. I appreciate the opportunity to appear before you to discuss the regulatory program for high-level radioactive waste management at the U.S. Nuclear Regulatory Commission (NRC).

In my testimony today, I would like to highlight NRC's mission to protect public health and safety, promote the common defense and security, and protect the environment. In this regard, I will describe NRC's current work related to the orderly closure of our licensing review for the proposed repository at Yucca Mountain, waste confidence, and our efforts to ensure the safety and security of spent nuclear fuel storage and ultimate disposal in a geologic repository.

**ORDERLY CLOSURE OF THE YUCCA MOUNTAIN LICENSE APPLICATION REVIEW**

The agency completed orderly closure of our licensing review of the proposed repository at Yucca Mountain by the end of Fiscal Year 2011. We documented and published publicly the results of the NRC review in one volume of the Safety Evaluation Report and three volumes of a Technical Evaluation Report. Additionally, over 40 other documents containing existing technical

data were prepared to describe the status of the technical review at the time the staff suspended the review of the license application. In September 2011, the Atomic Safety and Licensing Board completed all necessary and appropriate case management activities associated with the hearing process on the license application for the repository at Yucca Mountain. Since the closure of our review activities by the end of Fiscal Year 2011, the NRC has continued to close out contracts related to the Yucca Mountain proceeding and has recouped some of the additional funds that have been added to the previous carryover amount. As a result, the NRC currently has about \$11.1 million in unobligated carryover money appropriated from the Nuclear Waste Fund and about \$2.5 million of obligated, unexpended money appropriated from the Waste Fund. No additional funds from the Nuclear Waste Fund were appropriated to the NRC to perform any additional work related to Yucca Mountain in Fiscal Years 2012 or 2013.

The agency's actions to close the review of the Yucca Mountain license application have been challenged in the D.C. Circuit. In response to this challenge, we noted that sufficient funds had not been appropriated for the Commission to complete our review and adjudication of the license application. In August 2012, the D.C. Circuit issued an order holding the case in abeyance pending decisions on appropriations for Fiscal Year 2013. With the recent passage of appropriations for the remainder of Fiscal Year 2013, the parties in the case have since advised the Court that no additional funds have been appropriated for either NRC or Department of Energy for work related to Yucca Mountain. We are awaiting a decision by the Court.

#### **WASTE CONFIDENCE**

The Waste Confidence decision represents the Commission's generic finding regarding the environmental impacts of the continued storage of spent nuclear fuel after the end of the licensed operation of a nuclear power plant and prior to the ultimate disposal of that fuel in a permanent repository. Last year the U.S. Court of Appeals for the D.C. Circuit identified three

aspects in the Commission's most recent update of its Waste Confidence decision that required additional consideration under the National Environmental Policy Act (NEPA). In response to the Court's decision, the Commission directed the NRC staff to prepare by September 2014 a generic environmental impact statement that builds upon the existing environmental assessment that the NRC developed as part of the 2010 Waste Confidence Decision and focuses any additional analyses on the deficiencies identified in the D. C. Circuit's decision; the Commission also directed the staff to prepare a revised temporary storage rule. Additionally, the Commission directed that all affected license application reviews will continue, and the agency will not issue final licenses dependent upon the Waste Confidence Decision or the Temporary Storage Rule until these issues are addressed.

The agency is making progress in assessing these issues by developing drafts of the Waste Confidence environmental impact statement and Temporary Storage Rule. We recently completed the scoping process for the environmental impact statement on Waste Confidence and issued a scoping summary report in early March. We have extensively engaged the public in the process, holding more than six public meetings so far, distributing documents to hundreds of interested stakeholders, and assessing over 1,700 comments on the proposed scope of the impact statement. We expect that the draft environmental impact statement will be available for public comment later this year. We are committed to completing the environmental impact statement and Temporary Storage Rule in an effective, efficient, open, and timely manner.

#### **ENSURING SAFETY AND SECURITY**

The agency ensures that spent nuclear fuel is stored, handled, and transported safely and securely through our comprehensive regulatory program, including licensing, oversight, rulemaking, research, incident response, and international cooperation. The NRC staff regularly inspects spent fuel pools at licensed nuclear power plants, as well as dry cask storage facilities. We are currently reviewing applications to renew dry cask storage facilities at two different

reactor sites and to store spent fuel in numerous storage cask designs. In Fiscal Year 2012, the agency revised its regulations to require advanced notification to Native American tribes regarding transportation of certain types of nuclear waste, and the Commission approved a revision of the regulations for the physical protection of spent fuel during transportation. We are soliciting stakeholder comments and refining our regulatory processes for spent fuel storage and transportation to enhance their effectiveness and efficiency. In addition, we are cooperating with the Department of Energy, industry, international regulatory counterparts, and other stakeholders to identify, assess, and resolve safety, security, safeguards, and environmental issues that may be associated with storage and transportation of spent fuel.

#### **CONCLUSION**

Chairman Frelinghuysen Ranking Member Kaptur, and distinguished members of the Subcommittee, thank you for the opportunity to appear before you today. I would be pleased to respond to your questions.

Mr. FRELINGHUYSEN. Thank you, Mr. Weber. I thank both of you for your testimony.

Dr. Lyons, the Department proposed quite a bit of work in its Fiscal Year 2013 request relating to consolidated interim storage, a consent-based siting process, and again you requested funding for the Fiscal Year 2014 budget for these activities. Many would argue, and I am one of them, that some of the activities you have proposed for both years are unauthorized but we will turn to that in a minute.

I am interested in discussing the work that you have proposed for both of those years. You have \$60 million for the used nuclear fuel disposition activities. What specific activities does that request propose to fund?

Mr. LYONS. There is a wide range of activities, sir, and we would be happy to provide more detailed information. But to give you at least an overview of a number of the activities, for example, we are evaluating different generic geologic formations to better understand the extent to which they could be used as a geologic repository. We are either restarting or reinvigorating international cooperation in order to benefit from the activities going on internationally using a number of different geologic media. We are working with transportation networks to begin to reactivate the transportation planning and activities that would be needed if we can resume transportation. We are looking towards research in borehole disposal as still another possibility towards a geologic disposal site. We are planning what consolidated sites could look like. We have evaluated all of these with care to be sure that in the opinion of our counsel that we are well within the Nuclear Waste Policy Act requirements.

Mr. FRELINGHUYSEN. Is there any difference between the activities that you had for 2013 and 2014 in terms of the type of activities that you are involved in? Are you, for instance, soliciting designs for consolidated interim storage facilities?

Mr. LYONS. We would look towards generic designs, but I am doing nothing that could be interpreted as site-specific activities. I believe that generic activities are well within the Nuclear Waste Policy Act based on our general counsel's review. But we are doing no site-specific activities.

Mr. FRELINGHUYSEN. So you, to your mind, have the authority to do what you are doing?

Mr. LYONS. Yes, sir.

Mr. FRELINGHUYSEN. All right. So you would disagree with some of us who feel that to a great extent you are violating congressional intent here by proceeding the way you are?

Mr. LYONS. We have evaluated it carefully, sir. We believe we are well within the authorizations we have.

Mr. FRELINGHUYSEN. You were additionally constrained in Fiscal Year 2013, as were others, because you were operating under the continuing resolution. Which of the activities proposed under the used nuclear fuel disposition in the Fiscal Year 2013 budget request is the Department currently moving forward on?

Mr. LYONS. The ones I listed.

Mr. FRELINGHUYSEN. Any others?

Mr. LYONS. Are all being moved on now in 2013, except for the borehole work which is really just starting, of the ones I listed. And much of that work then will continue and expand in 2014 under the proposed budget.

Mr. FRELINGHUYSEN. Ms. Kaptur.

Ms. KAPTUR. Thank you, Mr. Chairman.

Dr. Lyons, some other nations such as France are considering closed or modified fuel cycles that use reprocessing or other means to extract more energy, and as you know, those processes appear to have potential to considerably reduce both the amount of high-level waste and the number of years that waste remains dangerous. What are the risks, both here and abroad, of these other fuel cycles? And also, per unit of energy generated, how much could a closed fuel cycle reduce our quantity of nuclear waste produced?

Mr. LYONS. Did you ask what are the risks? Was that the word you used?

Ms. KAPTUR. Yes.

Mr. LYONS. Well, there is at least—the primary risk I would list, Ms. Kaptur, would be we have research programs to try to work towards reprocessing systems that would provide less environmental damage and less proliferation risk and the PUREX process which is used in several countries. France uses the PUREX process, albeit a somewhat improved one over the one that we initiated back in the war years. So I am not sure if that addresses your question. Those are least risks.

Now, the French process does reduce somewhat the volume of waste, but the Department, the administration strongly agrees with the views expressed by the Blue Ribbon Commission, that the first focus in this country should be on demonstrating that we can open and operate a geologic repository. Even if we reprocess, such a repository will still be needed which is also why France is moving ahead with a repository. At the same time, the Blue Ribbon Commission endorsed and we maintain the strong research programs looking at future options for possible closing of the fuel cycle. In my view, whether a decision is made to close the fuel cycle in the future will depend on a complicated evaluation of a number of different factors by the leaders in Congress, and that will include the economics of repositories, the economics of reprocessing, the environmental impacts of reprocessing, and a number of other factors.

Ms. KAPTUR. If you were to look back, I actually do not remember when the Yucca Mountain project was first proposed. Could you estimate how much our country has spent to date on that project? And there are those who argue it was a complete waste of money. How would you respond to their criticisms, and approximately how much money has the nation now spent, and what have we gotten for it?

Mr. LYONS. Work on Yucca Mountain actually started before—on a limited basis started before the Nuclear Waste Policy Act of 1982, so it is a long time. You will get slightly different estimates of how much has been invested in Yucca as opposed to generic activities, but under the order of \$11 billion and we might quibble on the last digit, it is a very, very large number.

Ms. KAPTUR. And so for those that argue it was a waste of money we got nothing for it. How would you begin to respond to that criticism?

Mr. LYONS. I would respond that I grew up in Nevada, I lived in Nevada, I worked in Nevada, I directed the Los Alamos research on Yucca Mountain. I worked on Yucca Mountain when I was with Senator Domenici on the Hill. I have spent a good fraction of my life looking at Yucca Mountain and looking at, frankly, the politics in Nevada and the poisonous atmosphere created by the Nuclear Waste Policy Act Amendments of 1987. In my view, and the reason I continue in this job as one of my main focus areas, is I want to see progress. And in my view, I do not believe we will see that progress if we continue to try to force Yucca Mountain in Nevada. I think it is time to find—use a consent-based process, find a host that is eager for the project, and cut our losses and move ahead.

Ms. KAPTUR. If you were to go back and analyze the \$11 billion that was spent, obviously property was purchased, but what was the \$11 billion expended on decade after decade after decade?

Mr. LYONS. It was extensive characterization of the site, and that was some other research I directed at Los Alamos. It also went into preparation of the license application which was filed by the Department of Energy. A great deal of technical work. Also, a great deal of physical work at the site, very large tunnel, multiple boreholes, test holes, wells. It is a rather extensive complex and I have been in it many times.

Ms. KAPTUR. All right. Any detail you could provide to the record, and also to think about and so what did the nation learn from the expenditure of the \$11 billion, other than the politics of Nevada.

Mr. LYONS. Well, certainly there was substantial evaluation of what it takes for a successful repository and how the materials in spent fuel might possibly migrate through the environment into the biosphere where it could possibly affect people. Some of that, of course, is specific to Yucca, but much of it is broadly applicable to any repository. And Mike should speak to the NRC, but certainly much of the work at the NRC would also apply to other repository configurations.

Ms. KAPTUR. Thank you. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. Mr. Simpson.

Mr. SIMPSON. Thank you, Mr. Chairman.

I would argue that we have actually got something out of Yucca, and that is a big hole in the ground.

Mr. LYONS. Yes, sir.

Mr. SIMPSON. In order to store all of the studies that have been done on the most studied piece of earth in the world. So, we got something out of it.

You mentioned just now that we have made some progress, or at least we have looked at things that ought to be looked at by the NRC. Would there be any—and I will ask Mr. Weber this—would there be an advantage to continuing the license processing for Yucca Mountain even if we never put a barrel of anything in it except for all these studies? In order to get the process down so that when we do, if we switch to interim storage and a consent-based geological repository somewhere, can we learn anything from continuing the licensing process or just shutting it off now?



Mr. WEBER. Thank you, Congressman Simpson.

We benefited from our experience in conducting the licensing review because it is an unprecedented review for the Nuclear Regulatory Commission, and it was the first time we applied the regulations that were developed specifically for the proposed Yucca Mountain repository site. And in doing that, as Dr. Lyons has already pointed out, we had decades of actual physical experience in applying, understanding what technical demonstration would be required to make the case, that this facility would protect the environment for a million years, as well as understanding the nuances of the design. How would you best design a facility like that to isolate the waste for essentially the rest of time?

And in conducting our review, when we terminated the review, when we closed down the review, we took great care to document the results of our review that had been done to date in the form of these documents and the other documents that I referred to in my testimony because we wanted to preserve the knowledge gained, the capabilities, the analytical capabilities that were developed both within the Department of Energy and with the NRC so that we could make the necessary safety and environmental findings that we would have to make if we were to license the repository.

I would also like to address your point on interim storage. NRC has a demonstrated regulatory process that has been used successfully to license away from reactor independent spent-fuel storage installations, so we are quite confident that the regulations are in place and our regulatory processes are in place that could be used if there were another facility that would be proposed for away from reactor interim storage of spent nuclear fuel that we could do that review.

Mr. SIMPSON. But the question was would there be any benefit to continuing the licensing process, even if we do not end up opening Yucca Mountain? For the next four years, Yucca Mountain is not going to be a possibility. That is just the reality. But we have got to move past this debate. All I am asking is would there be any benefit of continuing the licensing process? Would we learn anything additional? Because at some point in time we are going to have to get a geological repository to put all the gunk that is left over. Or are we losing anything by just shutting down the licensing process now?

Mr. WEBER. I think we have captured all that we can capture within the program that we have exercised to date. At NRC, we focus on continuous improvement, and we always learn from our experience. And we apply that insight back into our regulatory processes to ensure that we are more effective and more efficient to better accomplish the mission of the NRC.

Mr. FRELINGHUYSEN. If the gentleman will yield.

The political process has trumped the licensing process here. I mean, this is the thing that disturbs us. I think Congressman Simpson is suggesting let us at least keep the licensing process alive. I think it is entirely reasonable. I must say I am enjoying a lot of people being upset with what has happened here. I do not regard this as a dead issue. I mean, at some point in time, given

the difficulty of finding a community that is going to consent, we are going to be back at this site.

Excuse me. Thank you for yielding.

Mr. SIMPSON. Dr. Lyons, the BRC in their discussions at one time suggested splitting commercial waste from weapons waste and then came to no conclusion on that. But you seemed in your testimony to say that the Administration is supportive of commingling those different waste streams at an interim storage facility?

Mr. LYONS. Mr. Simpson, actually, no. That is not what the administration strategy says. The Administration strategy recognizes that, as you said, the BRC did not reach a conclusion on commingling defense and civilian waste, and the strategy also left that as an open question suggesting that that could benefit from further discussions with Congress. What I noted is that the strategy also notes that presuming Congress agrees, there is nothing that would prevent defense and civilian wastes from utilizing any of the facilities I mentioned—the pilot, the consolidated, and of course, the repository. But that decision is not specified in the strategy. That is left open for further discussions and guidance from Congress.

Mr. SIMPSON. Well, obviously one of the problems is we cannot get one repository open, let alone having two repositories—one for civilian, one for defense waste. I question how long that would take.

Let me ask you one more question. When you talk with communities that potentially could be interested in being in this consent-based site, one of their concerns is how to define interim. Does an interim storage facility become a de facto permanent repository? If I talk to people in Idaho, and there are some people who are saying, you know, we could do interim storage in Idaho. I am not saying that is a popular opinion, but the question that always comes back to them is, then will we be the permanent repository? What is your answer to that? How do you convince these locations that we are talking interim storage, which is how long?

Mr. LYONS. Well, thank you very much for your question, and that is a very, very good question. Dealing with the whole issue of linkage between the interim and the repository, the Nuclear Waste Policy Act has a very, very tight linkage, which has had the effect of essentially blocking progress on an interim site. It is my understanding that when Senator Bingaman worked on his bill last year and was working with several colleagues, that it was the issue of linkage which led to only Senator Bingaman endorsing his final bill and the other colleagues not proceeding. And Senator Wyden has been quite public that as he is developing a bill this year, again with a number of colleagues, the linkage issue is a very sticky, very critical issue. So I completely agree with you.

The administration strategy, again, did not specify exactly what the linkage should be, other than to recognize that if it is as strict as the Nuclear Waste Policy Act, it will preclude progress on interim storage, but it recognized that some degree of linkage is important. I think one can imagine a number of softened forms of linkage which I am sure will be debated in Congress that would provide some measure of assurance to a host site at a consolidated storage facility that it would not become permanent. I think one of the most important things in this regard is the Commission's and

the Administration's support for a new organization which among many attributes needs to rebuild strong credibility with the communities that they are going to follow through on their actions.

Mr. SIMPSON. Thank you.

Mr. FRELINGHUYSEN. Thank you, Mr. Simpson.

Mr. Fattah.

Mr. FATTAH. I thank you.

So we have a number of things going on. This Administration has moved for the first time in 30 years to license new nuclear facilities, and I think the Administration should be applauded for moving in this area.

However, we have this continuing problem of storage. I was for Yucca Mountain, and I am still for Yucca Mountain. I guess everybody is for Yucca Mountain unless you live in Nevada; right? So the idea is that we could all have reliable electricity through nuclear, which we kind of went to sleep on for 30 years since Three Mile Island, but now we are back in the business. As long as we can send the waste to Nevada then we are good. And then something happened. There was an election. The President took a position that he would not proceed. And he won Nevada and he is probably not going to proceed. And so we are kind of stuck with the fact that we have been building up in these present facilities all of this waste, and we have been storing it onsite. Is that correct? So like in my nuclear plants in Pennsylvania it has been stored there; right?

Mr. LYONS. Yes, sir.

Mr. FATTAH. Now, my question is about the actual form of the storage because we saw some of the challenges that Japan had with the tsunami. Are there benefits to storage as I think the term is dry cask—than just kind of have in this, in a liquid form. Moreover, should we require at least in the 100 or plus sites we have, should we make sure that the temporary storage that has been going on for decades, be made as safe as possible?

Mr. LYONS. I am assuming that is more to you?

Mr. FRELINGHUYSEN. That is more to you. Mr. Weber.

Mr. WEBER. Okay. I would be happy to answer your question.

At the Nuclear Regulatory Commission, we ensure whether it is wet or dry storage, that it is safe, and it is secure.

Mr. FATTAH. I know. But there is a difference between wet and dry; right?

Mr. WEBER. There is a difference.

Mr. FATTAH. And what I am asking is what is the safer form of the storage in the 115 present sites or so around the country?

Mr. WEBER. There are benefits to dry cask storage because it is less reliant on active operations, and you have passive features that ensure the safety and the security of the spent nuclear fuel. However, you do need to cool the fuel for a period of time before under the current certificates.

Mr. FATTAH. Now, I am aware of that. But we have been cooling for a long time. This has been going on for three decades. All right? If we are going to take another decade to discuss this issue rather can't we move this waste to an interim site before we eventually, you know, decide on a permanent site? Is this something that should be done now so if there was some occurrence that it would

be in the best form for public safety. So dry is better than wet. And should we not think about a requirement to move this waste after the cooling to dry?

Mr. WEBER. We are considering just that now as part of our post-Fukushima follow-up actions. One of those studies that is under-way—

Mr. FATTAH. Now we are making news. This is good.

Mr. WEBER [continuing]. Is to evaluate what the benefits are and what the tradeoffs are if you were to expedite the transfer from wet storage to dry storage. You are probably aware that most plants in the United States today do rely, to some extent, on dry storage already.

Mr. FATTAH. No, I am aware that some have taken more—what I would consider more prudent approaches.

Mr. WEBER. Most have.

Mr. FATTAH. And what I am saying is should we not get the stragglers to move towards safer procedures?

Mr. WEBER. And that is the study that we currently have underway and are aggressively pursuing it.

Mr. FATTAH. Do you want to project how long it might take us to determine empirically whether the study might say this? I mean, are we a decade away or how far away?

Mr. WEBER. The study is much sooner than that.

Mr. FATTAH. Okay.

Mr. WEBER. Our current focus is on completing the Waste confidence activities that I referred to in my testimony. But as part of that we want to ensure that the Waste confidence environmental impact statement and the Temporary Storage Rule are informed by current studies about safety and security. And so you will be hearing more about that throughout this year as we complete those studies and as we roll out the draft environmental impact statement. And then once that technical work is done, then that will feed the regulatory analysis next year and the year after on what the benefits are of expediting the spent fuel transfer.

Mr. FATTAH. Okay. And one last question. I was just out in Washington State. The leakage we have there, any comments about remediation and how we might deal with this issue?

Mr. LYONS. Mr. Fattah, that is not within my program. That is the EM program but I might note that both the outgoing Secretary Chu and the nominee, Dr. Moniz in his confirmation hearing two days ago made it very clear that this is a focus of their attention and that they intend to resolve these issues.

Mr. FATTAH. Well, that was concise and succinct. It is not in your purview. I got you. Thank you very much.

Mr. FRELINGHUYSEN. Thank you, Mr. Fattah.

Mr. Nunnelee.

Mr. NUNNELEE. Thank you, Mr. Chairman.

You told us that the license review at Yucca Mountain cost approximately \$11 million. How much have the two agencies spent on the actual termination of the licensing process?

Mr. FRELINGHUYSEN. The Department of Energy, Mr. Nunnelee, spent \$138 million after the announcement that it was to be terminated, and that was through Fiscal Year 2012. There are small expenses that continue but they are quite small. \$138 million.

Mr. NUNNELEE. And from the Nuclear Regulatory Commission in Fiscal Year 2011, we spent about \$7 million. But I would point out that a large amount of that effort was devoted to completing these documents so that we would preserve the knowledge and the status of the regulatory review. And so we do not see that as money lost; that it is actually well invested to preserve that knowledge.

Mr. FRELINGHUYSEN. Would the gentleman yield?

Mr. NUNNELEE. I always yield to the chairman.

Mr. FRELINGHUYSEN. You have those reports there but we are due some other reports. Where are the rest of the safety evaluation reports?

Mr. WEBER. These documents here would be the core that would be used if we resumed the review to prepare the safety Evaluation Report. This first volume is part of the Safety Evaluation.

Mr. FRELINGHUYSEN. But there are other volumes that are out there.

Mr. WEBER. These are the three volumes, and then there would be one other volume that is not prepared. That would be the fifth volume, and that would document license conditions that would be proposed.

Mr. FRELINGHUYSEN. Why is that held up? Do you have the resources to do it?

Mr. WEBER. We did not draft the fifth volume, and we closed down the review at the end of Fiscal Year 2011. We do not have additional resources.

Mr. FRELINGHUYSEN. How much would it take you to finish that safety evaluation report?

Mr. WEBER. The estimate that we shared with Congress last year was about \$6.5 million. Now, as Commissioner Svinicki pointed out in a recent House hearing, time is the enemy because as time goes on some of our staff move on. They retire. They transfer to other agencies. So that cost will increase because bringing new people on-board will take more time to come up to speed, pick up where these reviews were stopped, and then apply themselves so that we could complete the regulatory findings. That would be documented in a Safety Evaluation Report.

Mr. FRELINGHUYSEN. Back to you. Thank you, Mr. Nunnelee.

Mr. NUNNELEE. Absolutely. So I think you are hitting on where my next question was going to be. If this Administration or successive Administration made the determination that, okay, we want to reactivate Yucca Mountain, what is it going to cost to get that going again?

Mr. LYONS. Well, from the Department of Energy standpoint, Mr. Nunnelee, first, I would note that we believe we have identified a path forward, a very strong path forward between the BRC, the administration's position, and the budget. And we would certainly be interested in—we believe it would well serve the taxpayers to continue along that path.

As far as what it would cost, that will depend on details of the court case. We do not know exactly what will be ordered in the case and the case is directly—will directly impact the NRC. But then the NRC actions will impact how the Department of Energy would respond. And of course, without knowing what the court decision

will be, how it may be reviewed, at many levels of NRC DOE justice I cannot give you that answer.

Mr. WEBER. Within the Nuclear Regulatory Commission, if we resume the licensing review, we do not have an estimate for what it would take to complete that review. The bulk of the staff's technical work is completed and documented in these documents. The larger part of the cost will be the hearing costs. And we also suspended that hearing in Fiscal Year 2011, and so part of it will depend on whether we have an applicant to proceed with the licensing review, and then part of it will be how much litigation is associated with it being challenged. So at this point, we do not have any estimate.

I would point out in terms of order of magnitude that when we were in full mode and doing the licensing review, we were estimating that it would take tens of millions of dollars to do the hearing process. And of course, we did not get those appropriations to support that, but that gives you an idea about the amount of resources it would require within the Nuclear Regulatory Commission.

Mr. LYONS. If I could expand just briefly, sir. For the Department of Energy, we were spending of the order of \$15 million a month at the time of the shutdown decision. We currently have 18.5 million of carryover.

Mr. NUNNELEE. In all the work that you have done since the decision was made to stop the process, have you found any problems in the technical or safety merits of the site?

Mr. LYONS. The Department of Energy, Mr. Nunnelee, submitted a license application based on their technical evaluation. The secretary's statement, certainly my statement, is that it is unworkable, but we are not commenting on the technical aspects which would be left up to the NRC to evaluate in the course of if the license were completed. But no, we have not identified a technical issue.

Mr. FRELINGHUYSEN. Would the gentleman yield? Would you address that issue? Have you found any technical or safety issues relating to Yucca's repository?

Mr. WEBER. These documents do not describe any significant technical concerns with respect to the safety of the proposed site. Now, I would have to provide a big caveat to that because these are the technical reviews. A big part of our licensing review is the hearing process, and it is in the hearing process that the parties are given an opportunity to challenge the veracity not just of the Department's application but also of the NRC staff's evaluation so that that process could reveal additional concerns that have yet to be spotlighted but we might have to resolve in order to make a final determination on the safety of the repository.

Mr. FRELINGHUYSEN. Thank you.

Mr. Nunnelee.

Mr. NUNNELEE. So to wrap it up, is it accurate to say that in the 1980s, they got the geology and science right; they just did not contemplate the politics?

Mr. LYONS. Well, again, Mr. Nunnelee, the evaluation of the Department of Energy was that the technical case was strong enough to submit the application. There has certainly been any number of

studies which suggest that there could be other repository geometries or geologies which might offer significant advantages but that is not what is required in filing a license with the NRC. The license must show adequate safety and the NRC's judgment is based on adequate safety. But could there be other geologies that might offer additional advantages? There have been many writings suggesting that that is the case.

Mr. FRELINGHUYSEN. Thank you, Mr. Nunnelee.

Mr. Visclosky.

Mr. VISCLOSKY. Thank you, Mr. Chairman.

I am going to take Mr. Simpson's advice and look forward. Have settlements and judgments against the Department increased since the policy change on Yucca Mountain, Dr. Lyons?

Mr. LYONS. Thank you for the question, Mr. Visclosky.

I do not have a breakdown by year. I know that the total we have paid is \$2.6 billion to date for the liability judgments, and I do not have it broken down by year. If you need that we can certainly provide it.

Mr. VISCLOSKY. I would appreciate having that.

Mr. LYONS. Okay.

Mr. VISCLOSKY. Do you know to date how much has been paid out of the judgment fund?

Mr. LYONS. That is the \$2.6 billion, sir.

Mr. VISCLOSKY. That is the \$2.6 billion.

Could you give us an estimate as to what the potential liability from that fund is going to be because of the failure to meet contractual obligations between now and 2048?

Mr. LYONS. The estimate is of the order of \$20 billion, assuming that we can move ahead with moving waste in 2020. Now, that is even sooner than we anticipate with a pilot of 2021, so that number might be slightly different. And those payments extend well beyond 2020, up to at least 2048. The number is about \$400 million a year average is anticipated for those judgments. A precise number, of course, depends on the details of the cases that are filed, the dates of the settlements, exactly what is in the settlements, but of the order of \$400 million a year.

Mr. VISCLOSKY. If you meet the 2020 deadline, did I understand your answer being that the liability would still be potentially \$20 billion?

Mr. LYONS. Additional \$20 billion on top of the \$2.6.

Mr. VISCLOSKY. Of the \$2.6—

Mr. LYONS. Yes.

Mr. VISCLOSKY. Which dwarfs the \$11 billion, although—and I am not quibbling over your answer on the \$11 billion, but I think the Committee's position would be we probably invested about \$15 billion here to date? I am not quibbling.

Mr. LYONS. There are good numbers between 10 and 15.

Mr. VISCLOSKY. Right. But \$20 billion.

We are in 2013. Do you have an estimate as to how many dollars will be paid out of the judgment fund this year?

Mr. LYONS. I only know the average number, sir, and that is the \$400 million.

Again, projecting ahead in any one specific year is very difficult without knowing—without being able to project what will happen in the court system.

Mr. VISCLOSKY. Right. Right.

Although, as Mr. Weber said, there have been increased court activity and judgments here. Or decisions I should say that have taken place. So if we take the \$11 billion, \$400 million average, we are going to be adding to that figure. And that is assuming we hit a benchmark of 2020 looking forward.

Mr. LYONS. I think I follow your reasoning.

Mr. VISCLOSKY. Listen, sometimes I do not.

Mr. LYONS. You are adding the \$11 billion.

Mr. VISCLOSKY. Do not worry about it.

Mr. LYONS. You are adding my number of \$11 billion.

Mr. VISCLOSKY. Well, I am saying taking your number of 11 and taking the average—and understanding it is an average, every year is different, none of us can predict the future, but we potentially are looking for another \$400 million out of the settlement fund each year assuming we hit the 2020 date, to add to the cost being expended because of the failure to do Yucca.

Mr. LYONS. That is correct, sir. And that is why the administration's action to begin to more accurately count the liabilities as an offset of the overall cost of the program I believe is such an important step. And that is one of the three key actions I described that are in the budget announced yesterday.

Mr. VISCLOSKY. Right.

Chairman, I just have a statement. And gentlemen, this is not directed to you because this was not your decision. I understand that. But I must tell you as an American citizen I am appalled that we have a very sophisticated hole in the ground in one of our 50 states that we have spent somewhere between \$11 and \$15 billion for. We are going to add \$400 million on average maybe a year going forward to the taxpayers of this country, some of whom make a living waiting on tables all day at a diner. Some people who work in a paper mill someplace. They work hard for that money and it is gone. It is gone and it is still going. And I think as a citizen what I find most appalling, and Congress has blame here, too, is the designation was made in 1987. And in the recommendations made, if everything breaks right and we have consent siting, we are talking about, what is it, 2048. For a country as good and talented and wealthy and smart as the United States of America to take 61 years and 15 administrations to make one lousy stinking decision where to put this stuff is appalling. And I do not direct that to you. It is a comment on how we govern today.

Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. Thank you, Mr. Visclosky.

Batting cleanup for this panel, Mr. Fleischmann.

Mr. FLEISCHMANN. Thank you, Mr. Chairman. And if I may, I have got some questions. I do not mean to beat a dead horse or a dead mountain, but I hope that someday there is a potential to really look at the Yucca facility because my colleague from Indiana is right. We spent a lot of money. We have done a lot of research and I know there are other considerations out there, but it is my



fervent hope that someday we can maybe look at that as a resource.

I wanted to follow up with some questions, if I may, about the reprocessing, Mr. Secretary. Are there other considerations that would impact the storage of the remaining waste if a modified or closed cycle is to be a future option?

Mr. LYONS. Well, thank you for the question, Mr. Fleischmann. And indeed, there have been already some very interesting studies on the question of how reprocessing might impact the current used fuel inventory within the country. Oak Ridge led an excellent study which evaluated whether—if reprocessing were available today, whether it would make sense for the bulk of the existing inventory. And the outcome of that study, which I think has been very well documented, was that given the range of different types of fuel that are currently in the inventory, that it really makes very little sense to look backwards and ask about a reprocessing. It may make sense, since we are now standardizing on fuel types, to look forward with reprocessing. And that goes back to my answer earlier that I think a question or a decision on whether we eventually move to a closed cycle with full reprocessing will be based on many factors, including economics, including nonproliferation, including environmental considerations. And that will be an important future decision.

Mr. FLEISCHMANN. If I may follow up then, Mr. Secretary, given the state of the uranium market, is the ability to retrieve waste at a later date necessary any longer as a technical consideration?

Mr. LYONS. There certainly have been suggestions in the past, Mr. Fleischmann, that we would be running out of uranium and that that was a driver for reprocessing. MIT has done a number of studies saying, "No, we are not running out of uranium. We certainly have enough for 100 years." But there is also a new program that we have begun—it happens also to be led through Oak Ridge—is looking at the extraction of uranium from seawater. And while that may sound funny when you first hear it, it is not funny. And the work at Oak Ridge is already to the point of suggesting that we could obtain uranium resources from the ocean, perhaps a factor of four or five more costly today than mined uranium. But Oak Ridge has already reduced that cost by at least a factor of four to five in just two years of work. I do not know where this work will end up but it is at least, I think, beyond argument that the supply of uranium in seawater is inexhaustible and that we are at least closing in on the possibility of demonstrating that it can be economically utilized. So I do not see a limitation on uranium resources essentially ever.

Mr. FLEISCHMANN. Mr. Secretary, I wanted to thank you. I was actually at Oak Ridge a couple of weeks ago, and I think this is the old Japanese technology I think that has been out there for quite some time that we are trying to improve on at Oak Ridge. Is that what you were alluding to, sir?

Mr. LYONS. Yes, sir. But I think Oak Ridge should take credit for very substantial improvements over the Japanese technology of at least a factor of four in the first two years of work.

Mr. FLEISCHMANN. Excellent.

Mr. LYONS. And they have many more good ideas.

Mr. FLEISCHMANN. Excellent. And I would agree with that.

Mr. Weber, how would the NRC's licensing process be different than current and past siting processes if it were to be part of a consent-based process as proposed by the Department of Energy?

Mr. WEBER. From the Nuclear Regulatory Commission's perspective, we think we could easily include a consent-based process. Our agency is open, transparent. We encourage stakeholder cooperation, engagement. The fact that we would have a potential applicant that would already have the consent of the local, state, regional level would only be a plus in terms of our regulatory process.

Mr. FLEISCHMANN. Thank you.

Mr. Chairman, I yield back.

Mr. FRELINGHUYSEN. Thank you, Mr. Fleischmann.

Ms. Kaptur for a brief comment and then we are going to conclude this panel.

Ms. KAPTUR. Thank you, Mr. Chairman.

I wanted to follow on Congressman Visclosky's really excellent summary about the amounts of dollars we are spending as a country. And I would have to comment that, you know, there are very few Americans or human beings really that have your experience. You are really very precious to our country, and we have a challenge that is unmet. Whether or not we ever build another nuclear facility in this country, or another nuclear weapon, we have this challenge of spent fuel. And we really are not meeting it.

And as I have listened to your testimony and read the related materials, a phrase keeps coming to mind and that is fear of the unknown. And I think whether it is Yucca Mountain or whether it is some other corner of our 50 states or territories, as we expend these dollars and really get very little for it in terms of actual storage, it seems to me that there is a larger problem that is outside of science, and it is how the general public perceives the nuclear-spent fuel. And we are not spending any money at explaining how does the average citizen get their mind around this? If I were to, I mean, sadly, because of Fukushima, Three Mile Island in our own country, and other situations, the public has a great fear of the unknown.

And our challenge is a greater one than just developing a site. It is trying to provide the storage that is necessary. But so few people have any experience. Most never take physics. Those of us that did struggled through it; some excelled. But even with that knowledge, the average citizen has absolutely no grounds on which to alleviate some of the fear of the unknown. People are reacting to a fear and a concern, and I do not feel we as a country have done a very good job of delving into that. And I do not think until we do, and we are able to explain what you are attempting to do, will we be successful. Maybe there is some place in New Jersey that wants the storage if we do not do it at Yucca Mountain.

Mr. FRELINGHUYSEN. Thank you very much. I do not think we do.

Ms. KAPTUR. You do not think you do. Well, you see, so I am trying to—I mean, basic questions, Doctor. For example, if I were to say to you to explain to the average citizen in the district that I represent how much of this accumulated stuff is there across the country? How many football fields will we fill up? I do not know

the answer to that. Maybe Mr. Visclosky does. He sat in this position much longer than I have.

And then is this thing throbbing with all this energy that is going to run over into my backyard? There has to be a way of explaining this, and until we do, I do not believe we will be successful as a country. And that is a political challenge and an educational challenge. Yes, sir.

Mr. LYONS. Can I respond very briefly? Those are superb comments, Ms. Kaptur.

As far as how many football fields, one football field of the order of 12 feet deep would take care of all the waste.

Your comment on fear of the unknown I think is very, very perceptive. And let me expand on that. With the examples that at least two of the communities that have come forth and expressed an interest in moving ahead on a consent basis, our communities that already have substantial experience with different types of rad waste and nuclear processes, I am sure it is well known that the so-called Eddy-Lea alliance, two counties in New Mexico around the WIPP facility have come forward, purchased land, said they are interested in moving ahead on a consent-base process, and intend to apply to the NRC for a license. One of the counties in Texas, Loving County, has recently passed a resolution saying—and that is in the same general area, right close to the low level waste facility in Andrews, Texas, that they want to compete on a consent basis for storage facilities.

To me, these are examples of exactly what you are saying. These are communities that already have substantial education and considerable knowledge of what it takes to be involved with nuclear processes. The care that is required and the safety that accrues with that care and with the detailed understanding.

So I think those are two examples of the point you are making that are communities that have this knowledge are interested.

Ms. KAPTUR. Doctor, could you tell me in both of those places are there military facilities, defense-related facilities adjacent to them or not?

Mr. LYONS. Well, WIPP at Carlsbad accepts defense waste and Loving County, which I could not tell you exactly where it is but it is more or less right across the border from WIPP. So I think it is fair to say both have that knowledge.

Ms. KAPTUR. Thank you.

Mr. FRELINGHUYSEN. Thank you, Ms. Kaptur. Gentlemen, thank you very much for your testimony. I appreciate your being here.

The next panel, front and center. Thank you very much.

Welcome witnesses. Mr. Frank Rusco, Director of Natural Resources and Environment Energy and Science for the Government Accountability Office. Again, Ms. Susan Eisenhower, former member of the Blue Ribbon Commission on America's Nuclear Future. And thirdly, Dr. Rodney Ewing, chairman of the Nuclear Waste Technical Review Board. Thank you all for your patience. It must have been, I will not say, agonizing to be in the audience for this length of time and not be able to get your oar in the water; now you have this opportunity. So we very much appreciate your time and your patience.

Mr. Rusco. Good morning. Thank you for being here.

Mr. RUSCO. Chairman Frelinghuysen, Ranking Member Kaptur, distinguished members of the Subcommittee, thank you for the opportunity to discuss GAO's work assessing key attributes and challenges associated with the storage or disposal of commercial spent nuclear fuel and other nuclear waste.

As you know, the Nuclear Waste Policy Act of 1982 directed the Department of Energy to investigate sites for a federal deep geologic repository to dispose of both civilian and defense-related spent nuclear fuel and other high-level nuclear waste. DOE studied several sites throughout the country, and in May 1986, the Secretary of Energy recommended three candidate sites for further consideration, including Yucca Mountain, Nevada.

In 1987, Congress amended the Act to direct DOE to focus its efforts only on Yucca Mountain, a site about 100 miles northwest of Las Vegas. Since 1983, DOE has spent about \$15 billion on the effort to site a permanent nuclear waste repository, most of this focused on Yucca Mountain. Despite this effort, DOE was unable to take custody of commercial spent nuclear fuel in 1998 as required under the NWPA. In 2008, DOE filed a license application with the Nuclear Regulatory Commission for construction of a permanent repository at Yucca Mountain. Then in 2009, DOE took steps to terminate the Yucca Mountain Repository program.

Instead, DOE established the Blue Ribbon Commission on America's Nuclear Future to evaluate nuclear waste management approaches, and the Commission consulted with GAO and used some of our prior work in their analysis and deliberations.

In January 2012, the Blue Ribbon Commission recommended a strategy for managing nuclear waste that included a new consent-based approach to siting future nuclear waste management facilities. A new organization other than DOE dedicated solely to the mission of nuclear waste management and empowered with the authority and funding needed to succeed and prompted new efforts to develop both an interim storage facility and a permanent disposal site.

One year later, in January 2013, DOE issued a strategy for managing spent nuclear fuel that endorsed the Commissions' recommendations. In addition to agreeing to a consent-based approach and calling for legislation to create a third party to manage spent nuclear fuel, DOE's strategy calls for the development of a pilot interim storage facility by 2021, a larger, long-term interim facility by 2025, and a permanent geologic repository for disposal by 2048.

This strategy does not, however, contain details of how and where such facilities could be sited or the assumptions used to estimate the specific timelines.

Based on GAO's past work evaluating DOE's efforts to manage commercial spent nuclear fuel and other nuclear waste, there are key lessons learned that will likely decide the success or failure of any approach to this problem. First, overcoming social and political opposition is crucial. Building social and political support for a specific plan will require a transparent process for evaluating a site. Educating the public about what is being planned and how it will work, and providing appropriate economic incentives for affected parties to engage in the process.

Second, it is essential to have consistent policy funding and project leadership over the long period of time it takes to identify, evaluate, and build a storage or disposal facility. DOE's efforts to garner social and political support for siting a permanent nuclear waste repository at Yucca Mountain were hurt by a lack of transparency. Specifically, a DOE expert panel in 1984 found that DOE's credibility was damaged in its initial site selection efforts because its site selection guidelines were criticized as being superficial and vague. DOE's credibility also suffered because of a lack of consistency in policy and leadership that caused delays in the project.

Finally, DOE's termination of Yucca Mountain after over two decades of consideration and the expense of billions of dollars further hurt DOE's credibility and may ultimately harm the agency's ability to find communities and states willing to host either an interim storage facility or a permanent repository for commercial spent nuclear fuel and other nuclear waste.

Regardless of what path is taken for the storage and disposal of nuclear waste, getting public and political consensus will be the greatest challenge. DOE or whatever body leads this effort must learn from past missteps if we are to avoid further delays and fruitless expense. The stakes are high and include both public health and security concerns, as well as the future of nuclear power as a source of electricity in the United States.

This ends my opening statement. I will be happy to answer any questions you may have.

[The statement of Mr. Rusco follows:]

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United States Government Accountability Office

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GAO

Testimony  
Before the Subcommittee on Energy and  
Water Development and Related Agencies,  
Committee on Appropriations, House of  
Representatives

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## COMMERCIAL SPENT NUCLEAR FUEL

### Observations on the Key Attributes and Challenges of Storage and Disposal Options

Statement of Frank Rusco, Director  
Natural Resources and Environment



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GAO-13-532T



Highlights of GAO-13-532T, a testimony before the Subcommittee on Energy and Water Development and Related Agencies, Committee on Appropriations, House of Representatives

### Why GAO Did This Study

Spent nuclear fuel, the used fuel removed from commercial nuclear power reactors, is one of the most hazardous substances created by humans. Commercial reactors have generated nearly 70,000 metric tons of spent fuel, which is currently stored at 75 reactor sites in 33 states, and this inventory is expected to more than double by 2055. The Nuclear Waste Policy Act of 1982, as amended, directs DOE to investigate the Yucca Mountain site in Nevada—100 miles northwest of Las Vegas—to determine if the site is suitable for a permanent repository for this and other nuclear waste. DOE submitted a license application for the Yucca Mountain site to the Nuclear Regulatory Commission in 2008, but in 2010 DOE suspended its licensing efforts and instead established a blue ribbon commission to study other options. The commission issued a report in January 2012 recommending a new strategy for managing nuclear waste, and DOE issued a new nuclear waste disposal strategy in 2013.

This testimony is primarily based on prior work GAO issued from November 2009 to August 2012 and updated with information from DOE. It discusses the key attributes and challenges of options that have been considered for storage or disposal of spent nuclear fuel.

GAO is making no new recommendations at this time.

View GAO-13-532T. For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov.

April 11, 2013

## COMMERCIAL SPENT NUCLEAR FUEL

### Observations on the Key Attributes and Challenges of Storage and Disposal Options

#### What GAO Found

In November 2009, GAO reported on the attributes and challenges of a Yucca Mountain repository. A key attribute identified was that the Department of Energy (DOE) had spent significant resources to carry out design, engineering, and testing activities on the Yucca Mountain site and had completed a license application and submitted it to the Nuclear Regulatory Commission, which has regulatory authority over the construction, operation, and closure of a repository. If the repository had been built as planned, GAO concluded that it would have provided a permanent solution for the nation's commercial nuclear fuel and other nuclear waste and minimized the uncertainty of future waste safety. Constructing the repository also could have helped address issues including federal liabilities resulting from industry lawsuits against DOE related to continued storage of spent nuclear fuel at reactor sites. However, not having the support of the administration and the state of Nevada proved a key challenge. As GAO reported in April 2011, DOE officials did not cite technical or safety issues with the Yucca Mountain repository project when the project's termination was announced but instead stated that other solutions could achieve broader support.

Temporarily storing spent fuel in a central location offers several positive attributes, as well as challenges, as GAO reported in November 2009 and August 2012. Positive attributes include allowing DOE to consolidate the nation's nuclear waste after reactors are decommissioned. Consolidation would decrease the complexity of securing and overseeing the waste located at reactor sites around the nation and would allow DOE to begin to address the taxpayer financial liabilities stemming from industry lawsuits. Interim storage could also provide the nation with some flexibility to consider alternative policies or new technologies. However, interim storage faces several challenges. First, DOE's statutory authority to develop interim storage is uncertain. Provisions in the Nuclear Waste Policy Act of 1982, as amended, that allow DOE to arrange for centralized interim storage have either expired or are unusable because they are tied to milestones in repository development that have not been met. Second, siting an interim storage facility could prove difficult. Even if a community might be willing to host such a facility could be challenging, particularly since some states have voiced concerns that an interim facility could become a de facto permanent disposal site. Third, interim storage may also present transportation challenges since it is likely that the spent fuel would have to be transported twice—once to the interim storage site and once to a permanent disposal site. Finally, developing centralized interim storage would not ultimately preclude the need for a permanent repository for spent nuclear fuel.

Siting, licensing, and developing a permanent repository at a location other than Yucca Mountain could provide the opportunity to find a location that might achieve broader acceptance, as GAO reported in November 2009 and August 2012, and could help avoid costly delays experienced by the Yucca Mountain repository program. However, developing an alternative repository would restart the likely costly and time-consuming process of developing a repository. It is also unclear whether the Nuclear Waste Fund—established under the Nuclear Waste Policy Act of 1982, as amended, to pay industry's share of the cost for the Yucca Mountain repository—will be sufficient to fund a repository at another site.

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Washington, DC 20548

Chairman Frelinghuysen, Ranking Member Kaptur, and Members of the Subcommittee:

I am pleased to be here today to discuss our work on issues related to the management of commercial spent nuclear fuel. Spent nuclear fuel—which has been used and removed from the reactor core of a commercial nuclear power plant—is considered one of the most hazardous substances on earth, and without protective shielding, its intense radioactivity can kill a person exposed directly to it within minutes, as well as cause environmental contamination and long-term health hazards, such as cancer, in those who receive smaller doses. As you know, the Nuclear Waste Policy Act of 1982 (NWPA) directed the Department of Energy (DOE) to investigate sites for a federal deep geologic repository to dispose of both civilian and defense-related spent nuclear fuel and other high-level nuclear waste.<sup>1</sup> DOE studied several sites throughout the country. In May 1986, the Secretary of Energy recommended three candidate sites for site characterization, including Yucca Mountain, Nevada, and in 1987, Congress amended the act to direct DOE to focus its efforts only on Yucca Mountain—a site about 100 miles northwest of Las Vegas.

DOE began studying the Yucca Mountain site as early as 1978 and has spent billions of dollars on this effort. Activities at the site have included investigating the characteristics of the site through surface, underground, and laboratory tests, as well as computer simulations; constructing a 25-foot diameter, 5-mile-long main tunnel, located 800 feet underground and a smaller tunnel nearly 2 miles long; and developing and submitting an application for a license to construct a nuclear waste repository. After submitting the license application in 2008 to the Nuclear Regulatory Commission, which has regulatory authority over the construction, operation, and closure of a repository, DOE took steps to terminate the Yucca Mountain repository program. DOE officials did not cite technical or safety issues with the Yucca Mountain site but stated that it was no longer a workable solution and that there are better solutions that can achieve a broader national consensus. DOE established the Blue Ribbon Commission on America's Nuclear Future in 2010 to review policies for

<sup>1</sup>This testimony concerns the disposal of civilian spent nuclear fuel (i.e., spent nuclear fuel that is periodically removed from commercial power reactors) and not defense-related spent nuclear fuel and other high-level waste from nuclear weapons production.



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managing the back end of the nuclear fuel cycle, including nuclear waste management approaches. Staff from the commission consulted with us and used some of our prior work in their analysis.

In its January 2012 report, the Blue Ribbon Commission recommended a strategy for managing nuclear waste with eight key elements. These included a new, consent-based approach to siting future nuclear waste management facilities; a new organization, rather than DOE, dedicated solely to implementing the program and empowered with the authority and resources to succeed; and prompt efforts to develop facilities both for interim storage and final disposal of spent nuclear fuel. According to the commission's report, an interim storage site should be developed first and focus on the spent fuel that is stored at closed reactor sites where nothing exists at the site except for the spent nuclear fuel. At the same time, the nation could be developing a final repository, which is likely to take decades to develop but that needs to be started in conjunction with any interim plans. In January 2013, DOE issued a strategy for the management of spent nuclear fuel, which used the Blue Ribbon Commission's recommendations as a starting point and endorsed the commission's key principles. In summary, DOE's strategy includes a consent-based approach to siting and implementing a waste management system and consists of developing and making available a pilot interim storage facility by 2021, a larger interim storage facility by 2025, and a geologic repository by 2048. DOE's January 2013 spent nuclear fuel strategy also stated that legislation should include requirements for a third party to manage the nation's spent nuclear fuel program.

Over the past decade, we have issued several reports related to the management of spent nuclear fuel.<sup>2</sup> We assessed in the findings of these reports the safety and security of spent nuclear fuel; the benefits,

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<sup>2</sup>For example, see GAO, Spent Nuclear Fuel: Options Exist to Further Enhance Security, GAO-03-426 (Washington, D.C.: July 15, 2003); GAO, Nuclear Waste Management: Key Attributes, Challenges, and Costs for the Yucca Mountain Repository and Two Potential Alternatives, GAO-10-48 (Washington, D.C.: Nov. 4, 2009); GAO, Yucca Mountain: Information on Alternative Uses of the Site and Related Challenges, GAO-11-847 (Washington, D.C.: Sept. 16, 2011); GAO, Commercial Nuclear Waste: Effects of a Termination of the Yucca Mountain Repository Program and Lessons Learned, GAO-11-229 (Washington, D.C.: April 8, 2011); and GAO, Spent Nuclear Fuel: Accumulating Quantities at Commercial Reactors Present Storage and Other Challenges, GAO-12-797 (Washington, D.C.: Aug. 15, 2012).

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challenges, and costs of the Yucca Mountain repository and two potential alternatives; lessons learned from the past 30 years of spent nuclear fuel management; alternative uses of the Yucca Mountain site and related challenges; and the challenges of accumulating quantities of spent nuclear fuel at reactor sites. This testimony is primarily based on prior work GAO issued from November 2009 to August 2012 and updated with information from DOE. It discusses the key attributes and challenges of options that have been considered for storage or disposal of spent nuclear fuel. A detailed description of our methodologies can be found in our published reports. We conducted the performance audit work that supports this testimony in accordance with generally accepted government auditing standards. Those standards require that we plan and perform audits to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Background

Since the publication of a 1957 report by the National Academy of Sciences,<sup>3</sup> a geologic repository has been considered the safest and most secure method of isolating spent nuclear fuel and other types of nuclear waste from humans and the environment.<sup>4</sup> During the 1950s and 1960s, managing spent nuclear fuel received relatively little attention from policymakers. The early regulators and developers of nuclear power viewed spent fuel disposal primarily as a technical problem that could be solved when necessary by application of existing technology. Attempts were made to reprocess the spent nuclear fuel, but they were not

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<sup>3</sup>National Academy of Sciences, *The Disposal of Radioactive Waste on Land* (Washington, D.C.: September 1957). This report suggested several potential alternatives for disposal of spent nuclear fuel, stressing that there are many potential sites for geologic disposal of spent fuel at various depths and in various geologic formations. Subsequent reports by the National Academy of Sciences and others have continued to endorse geologic isolation of spent nuclear fuel and have suggested that engineered barriers, such as corrosion-resistant containers, can provide additional layers of protection to such sites. International consensus also supports geologic disposal.

<sup>4</sup>In addition to commercial spent nuclear fuel, DOE manages about 13,000 metric tons of defense-related spent nuclear fuel and other high-level waste—primarily generated by the nation's nuclear weapons program. We issued a separate report on the impacts of terminating Yucca Mountain on the spent nuclear fuel and high-level waste managed by DOE. See GAO, *DOE Nuclear Waste: Better Information Needed on Waste Storage at DOE Sites as a Result of the Yucca Mountain Shutdown*, GAO-11-230 (Washington, D.C.: Mar. 23, 2011).

successful because of economic issues and concerns that reprocessed nuclear materials raised proliferation risks. The Atomic Energy Commission, a predecessor to DOE, attempted to develop high-level waste repositories in Kansas and New Mexico in the late 1960s and early 1970s, but neither succeeded because of local community and state opposition. NWPA established the disposal of spent nuclear fuel and high-level nuclear waste as a federal responsibility. Briefly, NWPA provided for the development of two geologic repositories and directed the Secretary of Energy to recommend three candidate sites and conduct studies to characterize each site. This same process was to be used for a second set of sites for the second repository. Table 1 summarizes some of the key decisions and events just prior to and as a result of NWPA.

**Table 1: Summary of Key Decisions and Events Related to Spent Nuclear Fuel Management**

Year	Summary of key decision or event
1978	As part of the National Waste Terminal Storage program, DOE began exploring Yucca Mountain, one of more than 25 sites that were being examined.
1983	The President signed the Nuclear Waste Policy Act of 1982 (NWPA), which directed the DOE to investigate sites for a federal deep geologic repository to dispose of spent nuclear fuel and other high-level waste. The act also authorized DOE to contract with commercial nuclear reactor operators to take custody of their spent nuclear fuel for disposal at the repository beginning in January 1998.
1983	DOE initially considered nine sites for the first repository; six of these were in the West, and three were in the South.
1984	DOE issued draft environmental assessments on all nine sites for the first repository.
1984	DOE issued general guidelines (with the concurrence of the Nuclear Regulatory Commission and after public review and comment) to be used by the Secretary of Energy in considering candidate sites for recommendation.
1986	Of the nine sites for the first repository, the Secretary nominated five sites (Richton Dome, MS; Yucca Mountain, NV; Deaf Smith County, TX; Davis Canyon, UT, and Hanford, WA) as suitable for site characterization. Each nomination was accompanied by an environmental assessment, as required by NWPA.
1986	Of the five nominations for the first repository, DOE recommended to the President three candidate sites for characterization: Yucca Mountain, NV; Deaf Smith County, TX; and Hanford, WA. The recommendation document stated that DOE assessed the sites using 14 performance measures including health and safety of the public and workers, environmental and socioeconomic factors, and repository and transportation costs. Yucca Mountain was the top-ranked site, the site that would cause, in aggregate, the least adverse impact.
1987	Congress amended NWPA to direct DOE to investigate only Yucca Mountain for a permanent repository. NWPA, as amended, authorized DOE to perform studies to determine if the Yucca Mountain site was suitable for a repository and make a site recommendation to the President if it met certain requirements. The amendments also directed the phaseout of funding for all research programs designed to evaluate the suitability of crystalline rock, which DOE had been studying for the second repository.
1987 - 1998	DOE continued to study the Yucca Mountain site.
1998	DOE was unable to begin taking custody of spent nuclear fuel in 1998 because of a series of delays due to, among other things, state and local opposition to the construction of a permanent nuclear waste repository in Nevada and technical complexities. However, DOE issued a viability assessment stating that Yucca Mountain was still a viable alternative.

Year	Summary of key decision or event
2002	As per the process outlined in NWPA, DOE recommended to the President approval of the Yucca Mountain site as a repository for spent nuclear fuel. The then-President subsequently recommended the site as suitable for a repository to Congress. The Governor of Nevada submitted a notice of disapproval to the Congress, and Congress effectively overrode the disapproval by voting to approve the site for the development of a permanent, high-level waste repository.
2008	DOE submitted a license application to the Nuclear Regulatory Commission for the construction of a permanent repository at Yucca Mountain.
2009	DOE announced plans to terminate its licensing efforts on Yucca Mountain.
2010	DOE terminated its efforts on Yucca Mountain and undertook an ambitious set of steps to dismantle the Yucca Mountain program by September 30, 2010. DOE took steps to preserve scientific and other data, eliminated the jobs of all federal employees working on the program, terminated program activities by contractors, and disposed of property from its Las Vegas offices by declaring the property abandoned.
2011	The Nuclear Regulatory Commission terminated its licensing efforts on Yucca Mountain.

Source: GAO analysis of DOE documents.

In the Secretary of Energy's February 2002 recommendation to the President that Yucca Mountain be developed as the site for an underground repository for spent fuel and other radioactive wastes, the Secretary described the three criteria to make the determination that Yucca Mountain was the appropriate site. Specifically:

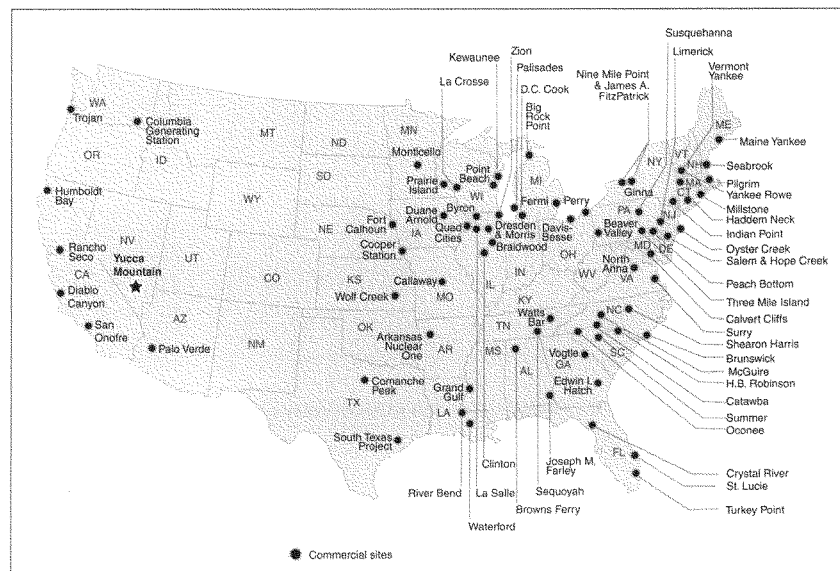
- Is Yucca Mountain a scientifically and technically suitable site for a repository?
- Are there compelling national interests that favor proceeding with the decision to site a repository there?
- Are there countervailing considerations that would outweigh those interests?

The Secretary also described the steps DOE had taken to inform residents and others. Specifically, DOE held meetings in the vicinity of the prospective site to inform the residents of the site's consideration as a repository and receive their comments, as directed by NWPA. The Secretary added that DOE went beyond NWPA's requirements for providing notice and information prior to the selection of Yucca Mountain. He concluded that the Yucca Mountain site was qualified as the site for the repository and accordingly recommended the site to the President.

Since the Secretary's recommendation was made, the nation's inventory of commercial spent nuclear fuel has continued to grow. The nation currently has about 70,000 metric tons of commercial spent nuclear fuel stored at 75 sites in 33 states (see fig. 1). This inventory is expected to more than double by 2055—assuming that the nation's current reactors continue to produce spent nuclear fuel at the same rate and that no new reactors are brought online, and that some decline in the generation of

spent fuel takes place as reactors are retired. Although some elements of spent nuclear fuel cool and decay quickly, becoming less dangerous, others remain dangerous to human health and the environment for tens of thousands of years.

Figure 1: Current Storage Sites for Commercial Spent Nuclear Fuel



Source: DOE.

Note: Locations are approximate. DOE has reported that it is responsible for managing nuclear waste at 121 sites in 39 states, which includes high-level waste from nuclear weapons production and spent nuclear fuel at 5 sites managed by DOE—2 of which are licensed by the Nuclear Regulatory Commission and contain commercial spent nuclear fuel, at Fort St. Vrain in Colorado, and at the Idaho National Laboratory—and several sites that have only research reactors that generate small amounts of waste that will be consolidated at the Idaho National Laboratory for packaging prior to disposal.

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Most commercial spent nuclear fuel is stored at operating reactor sites; it is immersed in pools of water designed to cool and isolate it from the environment. Without a nuclear waste repository to move the spent nuclear fuel to, the racks in the pools holding spent fuel have been rearranged to allow for more dense storage of the spent fuel. Even with this rearrangement, spent nuclear fuel pools are reaching their capacities. As reactor operators have run out of space in their spent nuclear fuel pools, they have turned increasingly to dry cask storage systems that generally consist of stainless steel canisters placed inside larger stainless steel or concrete casks. A dry storage facility typically consists of security and safety mechanisms, such as a defensive perimeter with intrusion detection devices and radiation monitors surrounding a concrete pad with the dry storage casks emplaced on it. Regulatory requirements for radiation exposure for this type of facility are significantly different from those of a repository. For example, spent fuel need only be stored safely for the life of the storage facility, currently 40 years, which is in contrast to the 1 million year period for which safe storage must be demonstrated under the Environmental Protection Agency regulation promulgated for the Yucca Mountain repository. In August 2012, we reported that reactors at nine sites have been retired and that seven of these sites have completely removed spent fuel from their pools, as well as removing all infrastructure except that needed to safeguard the spent fuel. Since then, an eighth site has also emptied its pool, and is in the process of removing associated infrastructure. These sites serve no other purpose than to continue storing this spent fuel. As additional reactors retire, reactor operators will likely move all their spent nuclear fuel to dry storage and remove all other structures. We reported in November 2009 that experts we spoke with stated that dry cask storage systems are expected to be able to safely store spent nuclear fuel for at least 100 years.<sup>5</sup> The experts said that, if these systems degrade over time, the spent nuclear fuel may have to be repackaged, which could require construction of new spent nuclear fuel pools or other structures to safely transfer the spent nuclear fuel to new storage systems. In addition, the experts said that spent fuel in centralized interim storage could present future security risks because, as spent fuel cools, it loses some of its self-protective qualities, potentially making it a more attractive target for sabotage or theft.

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<sup>5</sup>GAO-10-48.

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NWPA also authorized DOE to contract with commercial nuclear reactor operators to take custody of their spent nuclear fuel for disposal at the repository beginning in January 1998. Ultimately, DOE was unable to meet this 1998 date. As we reported in August 2012,<sup>6</sup> because DOE did not take custody of the spent fuel starting in 1998, as required under NWPA, DOE reported that, as of September 2011, 76 lawsuits had been filed against it by utilities to recover claimed damages resulting from the delay. In August 2012, we reported that these lawsuits have resulted in a cost to taxpayers of about \$1.6 billion from the U.S. Treasury's judgment fund. We also reported that DOE estimated that future liabilities would total about an additional \$21 billion through 2020.<sup>7</sup> In November 2012, DOE reported that the cost to taxpayers is now \$2.6 billion and that future liabilities are now approximately \$19.7 billion for a total of about \$22.3 billion. DOE has also estimated that future liabilities may cost about \$500 million each year after 2020.

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### Attributes and Challenges of the Yucca Mountain Repository

In November 2009, we reported on the attributes and challenges of a Yucca Mountain repository.<sup>8</sup> We reported that DOE had spent billions of dollars for design, engineering, and testing activities for the Yucca Mountain site and had submitted a license to the Nuclear Regulatory Commission. If the repository had been built as planned, we stated that it would have provided a permanent solution for the nation's nuclear waste, including commercial nuclear fuel, and would have minimized the uncertainty of future waste safety. Based on a review of key documents and interviews with DOE, Nuclear Regulatory Commission, and numerous other officials, we also reported in November 2009 that the construction of a repository at Yucca Mountain could have allowed the government to begin taking possession of the nuclear waste in about 10 to 30 years. DOE had reported in July 2008 that its best achievable date for opening the repository, if it had received Nuclear Regulatory Commission approval, would have been 2020. If the Yucca Mountain repository was completed and operational sooner than one or more temporary storage facilities or an alternative repository, it could have helped address the federal liabilities resulting from industry lawsuits

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<sup>6</sup>GAO-12-797.

<sup>7</sup>GAO 12-797.

<sup>8</sup>GAO-10-48.

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related to continued storage of spent nuclear fuel at reactor sites. We also reported in August 2012 that states and community groups had raised concerns that the Nuclear Regulatory Commission was extending the licenses of current reactors or approving licenses for new reactors without a long-term solution for the disposition of spent nuclear fuel.<sup>9</sup> If Yucca Mountain was licensed and constructed and began accepting spent nuclear fuel for disposal by 2027, which was the earliest likely opening date we estimated in our August 2012 report, some of these concerns could have been addressed.

However, we reported in November 2009 that the Yucca Mountain repository also faced challenges. The key challenge that we reported was that the repository did not have the support of the administration or the state of Nevada. Although the President in 2002 recommended the Yucca Mountain site for a repository, by 2010, the President's fiscal year 2011 budget submission proposed eliminating all funding for the repository. In April 2011, we reported that DOE officials did not cite technical or safety issues with the Yucca Mountain repository project when the project's termination was announced.<sup>10</sup> Instead officials stated that other solutions could achieve broader support. The state of Nevada and other groups that oppose the Yucca Mountain repository have raised technical points, site-specific concerns, and equity issues. These efforts to delay or terminate the repository could continue if the licensing process were resumed. For example, the state of Nevada had previously denied the water rights DOE needs for construction of a rail spur and facility structures at Yucca Mountain. DOE officials told us that constructing the rail line or the facilities at Yucca Mountain without those water rights would be difficult. Second, as we reported in April 2011, DOE could also

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<sup>9</sup>In December 2010, the Nuclear Regulatory Commission issued a determination and associated rule stating that spent fuel can be safely stored for up to 60 years beyond the licensed life of the reactor, or up to 120 years. Four states, an Indian community, and environmental groups petitioned for review of the Nuclear Regulatory Commission's rule, however, arguing in part that the commission violated the National Environmental Policy Act by failing to prepare an environmental impact statement in connection with the determination. On June 8, 2012, the U.S. Court of Appeals for the District of Columbia Circuit held that the rulemaking required either an environmental impact statement or a finding of no significant environmental impact and remanded the determination and rule back to the Nuclear Regulatory Commission for further analysis. The commission is conducting an environmental review and is not approving any new licenses or license extensions until the review is complete.

<sup>10</sup>GAO-11-229.



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face challenges in reconstituting its work force. According to DOE, contractor, and former DOE officials we spoke with, it could take years for DOE to assemble the right mix of experts to restart work on the license application. When DOE terminated its licensing efforts, many of the federal and contractor staff working on the program retired or moved on to other jobs. Third, project funding could continue to be a challenge. As we reported, DOE's budget for the Yucca Mountain repository program was not predictable because annual appropriations varied by as much as 20 percent from year to year. We recommended that Congress consider a more predictable funding mechanism for the project, which the Blue Ribbon Commission also recommended in its January 2012 report.

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### Attributes and Challenges of Centralized Interim Storage

We reported in November 2009 on several positive attributes of centralized interim storage—a near-term temporary storage alternative for managing the spent fuel that has accumulated and will continue to accumulate. First, centralized interim storage could allow DOE to consolidate the nation's nuclear waste after reactors are decommissioned, thereby decreasing the complexity of securing and overseeing the waste located at reactor sites around the nation and increasing the efficiency of waste storage operations. Second, by moving spent nuclear fuel from decommissioned reactor sites to DOE's centralized interim storage facility and taking custody of the spent fuel, DOE would begin to address the taxpayer financial liabilities stemming from industry lawsuits. Third, centralized interim storage could prevent utilities from having to build additional dry storage to store nuclear waste at operating reactor sites. Fourth, centralized interim storage could also provide the nation with some flexibility to consider alternative policies or new technologies by giving more time to consider alternatives and implement them. For example, centralized interim storage would keep spent fuel in a safe, easily accessible configuration for future recycling, if the nation decided to pursue recycling as a management option in the future.

However, centralized interim storage also presents challenges. First, as we reported in November 2009 and August 2012, a key challenge confronting centralized interim storage is the uncertainty of DOE's statutory authority to provide centralized storage.<sup>11</sup> Provisions in NWP

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<sup>11</sup>GAO-10-48 and GAO-12-797.

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that allow DOE to arrange for centralized storage have either expired or are unusable because they are tied to milestones in repository development that have not been met. It is not clear what other authority DOE or an independent entity might use for providing centralized interim storage of spent nuclear fuel. A second, equally important, challenge is the likelihood of opposition during site selection for a centralized interim storage facility. As we reported in November 2009, even if a community might be willing to host such a facility, finding a state that would be willing to host it could be extremely challenging, particularly since some states have voiced concerns that a centralized interim facility could become a de facto permanent disposal site. In 2011, the Western Governors Association passed a resolution stating that no centralized interim storage facility for spent nuclear fuel can be established in a western state without the expressed written consent of the governors. Third, centralized interim storage may also present transportation challenges. As we reported in August 2012, it is likely that the spent fuel would have to be transported twice—once to the centralized interim storage site and once to a permanent disposal site. The total distance over which the spent fuel would have to be transported would likely be greater than with other alternatives. The Nuclear Energy Institute has reported that of all the spent fuel currently in dry storage, only about 30 percent is directly transportable because of its current heat load, particularly since the nuclear industry packaged some spent nuclear fuel in dry storage containers to maximize storage capacity. We also reported in August 2012 that officials from a state regional organization that we spoke with said that transportation planning could be a complex endeavor, potentially taking 10 years to reach agreement on transportation routes and safety and security procedures. Fourth, although DOE had previously estimated that it could site, license, construct, and begin operations of a centralized interim storage facility within 6 years, it could take considerably longer depending on how long it takes to find a willing state and community, as well as license and construct the facility. Finally, as we reported in November 2009, developing centralized interim storage would not ultimately preclude the need for final disposal of the spent nuclear fuel.

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### Attributes and Challenges of a Permanent Repository at a Location Other Than Yucca Mountain

As we reported in November 2009, siting, licensing, and developing a permanent repository at a location other than Yucca Mountain could provide the opportunity to find a location that might achieve broader acceptance than the Yucca Mountain repository program. If a more widely accepted approach or site is identified, it carries the potential for avoiding costly delays experienced by the Yucca Mountain repository program. In addition, a new approach that involves a new entity for spent fuel management, as we concluded in our April 2011 report and the Blue Ribbon Commission recommended in January 2012, could add to transparency and consensus building.

However, there are also key challenges to developing an alternative repository. First, as we reported in April 2011,<sup>12</sup> developing a repository other than Yucca Mountain will restart the likely time-consuming and costly process of siting, licensing, and developing a repository. We reported that DOE had spent nearly \$15 billion on the Yucca Mountain project.<sup>13</sup> It is not yet clear how much it will ultimately cost to begin the process again and develop a repository at another location. Moreover, it is uncertain what legislative changes might be needed, if any, in part because the Nuclear Waste Policy Act, as amended, directs DOE to terminate all site specific activities at candidate sites other than Yucca Mountain. Second, it is unclear whether the Nuclear Waste Fund will be sufficient to fund a repository at another site. The fund was established under NWPA to pay industry's share of the cost for the Yucca Mountain repository and was funded by a fee of one-tenth of a cent per kilowatt-hour of nuclear-generated electricity. The fund paid about 65 percent, or about \$9.5 billion, of the expenditure for Yucca Mountain. According to DOE's fiscal year 2012 financial report, the Nuclear Waste Fund currently has about \$29 billion and grows by over \$1 billion each year from accumulated fees and interest. However, utilities only pay into the fund for as long as their reactors are operating, and it is not clear how much longer reactor operators will be paying into the fund. For example, two utilities have announced plans—one in 2010 and the other in 2013—to shut down two reactor sites prior to their license expiration. As reactors are retired, they will need to be replaced by new reactors paying into the fund, or according to DOE officials, the fund might be drawn down faster than it can be replenished when developing a new repository.

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<sup>12</sup>GAO-11-229.

<sup>13</sup>In 2010 dollars. GAO-11-229.

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When more comprehensive information becomes available both about the process that DOE, or another agency, will be using to select a site and possible locations for a permanent repository, additional positive attributes as well as challenges may also come to light.

Chairman Frelinghuysen, Ranking Member Kaptur, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions you may have at this time.

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**GAO Contact and  
Staff  
Acknowledgments**

If you or your staff members have any questions about this testimony, please contact me at (202) 512-3841 or [ruscof@gao.gov](mailto:ruscof@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Janet Frisch, Assistant Director, and Kevin Bray, Robert Sánchez, and Kiki Theodoropoulos made key contributions to this testimony.



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Mr. FRELINGHUYSEN. Thank you very much.

Ms. Eisenhower.

Ms. EISENHOWER. Chairman Frelinghuysen, Ranking Member Kaptur, distinguished members of the Subcommittee, it is a pleasure to appear before you today to discuss nuclear waste programs and strategies. I believe our nation must craft a sustainable solution to the nuclear waste management issue.

May I say on a personal note that I share your frustration about the expenditure of public money in this area, and that was one of the reasons I agreed to become a member of the Blue Ribbon Commission. Our charge was to conduct a comprehensive review of our nation's nuclear waste policy. In our final report we made eight key integrated recommendations, including the establishment of a Fed Corp with rigorous congressional oversight to assume the responsibilities for the backend of the nuclear fuel cycle. In short, it would be a fresh start.

On the direction of the Secretary of Energy, we were not a siting body, so we did not evaluate any specific aspect of Yucca Mountain or any other location as a potential host for a storage or disposal facility. Rather, our mission was strategic; to propose changes to our waste management system that could break the current impasse. Our consent-based approach—and I would really like to emphasize this—neither includes or excludes Yucca Mountain. And can and should be applied regardless of what sites are ultimately chosen for long-term nuclear waste management, for soon we will need more than one site to legally handle the disposition of spent nuclear fuel.

A main focus of our policy recommendation was “prompt efforts to develop one or more geological disposal facilities.” As a complement to a repository, we also urged “prompt efforts to develop one or more consolidated storage facilities.” The arguments in favor of moving quickly on consolidated storage are strongest for stranded spent fuel from shutdown plant sites. There were nine such sites when we completed our report, and there have been other announcements and closures are forthcoming.

Consolidated storage will provide valuable flexibility and redundancy in the nuclear waste management system, while realizing cost savings and giving future decision makers greater choices as among other things technology advances.

The Obama administration's January 2013 strategy for nuclear waste management embraces the spirit of the Commission's recommendations. The administration's projected timeframe for establishing consolidated storage capability is generally consistent with the Commission's findings, though the administration projects development of a repository will take a decade plus longer than what the Commission thought would be necessary.

As we pointed out in our report, work towards a consolidated storage facility can begin immediately under the existing provisions of the Nuclear Waste Policy Act. According to a legal analysis performed for the BRC, which I would like to submit for the record, further legislative action would not be required prior to the designation of the storage site, at which time Congress would need to amend the act to allow construction to go forward independent of the status of a permanent repository.

As with developing a disposal capability, the critical challenge for consolidated storage will be finding a site or sites. As part of a consent-based approach, we must undertake renewed effort to communicate broadly about the benefits and risks associated with long-term management of spent fuel and high-level waste. Time and time again during the Commission hearings we heard people expressing deep concern about the transport of spent fuel, and I was personally impressed by the safety record that exists in this field. The safety of transportation of radioactive waste actually has a long and rather remarkable safety history.

According to the American Nuclear Society, over the past 40 years, about 3,000 shipments of spent nuclear fuel have navigated more than 1.7 million miles of roads and railways. Of all this travel, no radioactive materials have been released to contaminate the environment as a result of an accident. And I think part of the reason for that may be because every ton of used fuel that is shipped is encased in about four tons of protective shielding.

Anyway, an effective outreach program can help point out these things and can help build public confidence that spent fuel and high-level radioactive waste can be safely shipped, stored, and disposed of in the United States.

Finally, any robust and well managed waste program needs access to funds that the nuclear utility rate payers are already providing for the purpose of nuclear waste management. If the status quo continues, the parallel storage and disposal programs we recommended could be in competition with each other for limited funds instead of being mutually supportive. A consent-based setting system will also depend on providing assurances to the host communities that a storage facility or repository is part of a reliable well-managed program. This could be undermined if financial resources are not assured.

In closing, let me thank you very, very much for letting me have this opportunity. And I reaffirm my own commitment to work with the Subcommittee in any way I can to move this to a path towards success. Thank you.

[The statement of Ms. Eisenhower follows:]



STATEMENT OF  
 MS. SUSAN EISENHOWER, FORMER MEMBER  
 BLUE RIBBON COMMISSION ON AMERICA'S NUCLEAR FUTURE  
 BEFORE THE  
 SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT  
 U.S. HOUSE OF REPRESENTATIVES  
 FIRST SESSION, 113TH CONGRESS  
 APRIL 11, 2013

Chairman Frelinghuysen, Ranking Member Kaptur, distinguished members of the Subcommittee, it is a pleasure to appear before you today to discuss nuclear waste programs and strategies. I was most pleased to receive the invitation to testify today because I believe our nation simply must craft a sustainable solution to the nuclear waste management issue.

**BRC Report Overview**

As you know, the Blue Ribbon Commission on which I served was formed by the Secretary of Energy at the direction of the President. Our charge was to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle and to recommend a new strategy. We delivered our final report to the Secretary in January of last year, and made eight key recommendations in that report, which articulated:

**1. A new, consent-based approach to siting future nuclear waste management facilities.**

Experience in the United States and in other nations suggests that any attempt to force a top-down, federally mandated solution over the objections of a state or community—far from being more efficient—will take longer, cost more, and have lower odds of ultimate success. By contrast, the approach we recommend is explicitly adaptive, staged, and consent-based. Based on a review of successful siting processes in the United States and abroad—including most notably the siting of a disposal facility for transuranic radioactive waste, the Waste Isolation Pilot Plant (WIPP) in New Mexico, and recent positive outcomes in Spain, Finland and Sweden—we believe this type of approach can provide the flexibility and sustain the public trust and confidence needed to see controversial facilities through to completion.

**2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed.**

The overall record of DOE and of the federal government as a whole has not inspired confidence or trust in our nation's nuclear waste management program. For this and other reasons, the Commission concluded that new institutional leadership is needed. Specifically, we recommended a single-purpose, Congressionally-chartered federal corporation, although there may be other organizational structures that could work. We believe a Fed Corp is best suited to provide the stability, focus, and credibility needed to get the waste program back on track. For

the new organization to succeed, a substantial degree of implementing authority and assured access to funds must be paired with rigorous financial, technical, and regulatory oversight by Congress and the appropriate government agencies.

**3. Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management.**

The 1982 Nuclear Waste Policy Act (NWPA) created a “polluter pays” funding mechanism to ensure that the full costs of disposing of commercial spent fuel would be paid by utilities - and their ratepayers - with no impact on taxpayers or the federal budget. Nuclear utilities are assessed a fee on every kilowatt-hour of nuclear-generated electricity as a *quid pro quo* payment in exchange for the federal government’s contractual commitment to begin accepting commercial spent fuel beginning by January 31, 1998. Fee revenues go to the government’s Nuclear Waste Fund, which was established for the sole purpose of covering the cost of disposing of civilian nuclear waste and ensuring that the waste program would not have to compete with other funding priorities. The Fund does not work as intended. A series of Executive Branch and Congressional actions has made annual fee revenues - approximately \$750 million per year - and the unspent \$27 billion balance in the Fund effectively inaccessible to the waste program. Instead, the waste program must compete for federal funding each year and is therefore subject to exactly the budget constraints and uncertainties that the Fund was created to avoid. This situation must be remedied immediately to allow the program to succeed.

**4. Prompt efforts to develop one or more geologic disposal facilities.**

The conclusion that disposal is needed and that deep geologic disposal is the scientifically preferred approach has been reached by every expert panel that has looked at the issue and by every other country that is pursuing a nuclear waste management program. Moreover, all spent fuel reprocessing or recycle options-- either already available or under active development at this time-- still generate waste streams that require a permanent disposal solution.

The Commission recognized that current law establishes Yucca Mountain in Nevada as the site for the first U.S. repository for spent fuel and high-level waste. The Blue Ribbon Commission was not chartered as a siting commission. Accordingly, we did not evaluate Yucca Mountain or any other location as a potential site for the storage or disposal of spent nuclear fuel and high-level waste, nor did we take a position on the Administration’s request to withdraw the license application. We simply noted that regardless what happens with Yucca Mountain, the U.S. inventory of spent nuclear fuel will soon exceed the amount that can be legally emplaced at this site until a second repository is in operation. So under current law, the United States will need to find a new disposal site even if Yucca Mountain goes forward. We believe the approach set forth here provides the best strategy for assuring continued progress, regardless of the fate of Yucca Mountain.

**5. Prompt efforts to develop one or more consolidated storage facilities.**

Developing consolidated storage capacity would allow the federal government to begin the orderly transfer of spent fuel from reactor sites to safe and secure centralized facilities, independent of the schedule for operating a permanent repository. The arguments in favor of consolidated storage are strongest for “stranded” spent fuel from shutdown plant sites; of which there are ten across the country. Stranded fuel should be first in line for transfer to a consolidated facility so that these plant sites can be completely decommissioned and put to other beneficial uses. Looking beyond the issue of today’s stranded fuel, the availability of consolidated storage will provide valuable flexibility in the nuclear waste management system that could achieve meaningful cost savings for both ratepayers and taxpayers when a significant number of plants are shut down in the future. They can also provide back-up storage in the event that spent fuel needs to be moved quickly from a reactor site, and would provide an excellent platform for ongoing R&D to better understand how the storage systems currently in use perform over time.

**6. Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available.**

The current system of standards and regulations governing the transport of spent fuel and other nuclear materials appears to have functioned well, and the safety record for past shipments of these types of materials is excellent. (According to the American Nuclear Society, “Over the past 40 years, about 3,000 shipments of spent nuclear fuel have navigated more than 1.7 million miles of U.S. roads and railways. Of all this travel, no radioactive materials have been released to contaminate the environment as a result from an accident.”)

That being said, past experiences in the United States and abroad, and extensive comments to the Commission, indicate that many people fear the transportation of nuclear materials. Thus greater transport demands for nuclear materials are likely to raise new public concerns. This is why public education is key to this process.

At the same time, to allay these concerns while ensuring the highest levels of transport safety, the Commission recommended that State, tribal and local officials should be extensively involved in transportation planning and should be given the resources necessary to discharge their roles and obligations in this arena. Historically, some programs have treated transportation planning as an afterthought. No successful programs have done so.

**7. Support for advances in nuclear energy technology and for workforce development.**

Advances in nuclear energy technology have the potential to deliver an array of benefits across a wide range of energy policy goals. The benefits identified by the Commission—in light of the environmental and energy security challenges the United States and the world will confront this

century—justify sustained public- and private-sector support for RD&D on advanced reactor and fuel cycle technologies.

The Commission also recommended expanded federal, joint labor-management and university-based support for advanced science, technology, engineering, and mathematics training to develop the skilled workforce needed to support an effective waste management program, as well as a viable domestic nuclear industry. At the same time, DOE and the nuclear energy industry should work to ensure that valuable existing capabilities and assets, including critical infrastructure and human expertise, are maintained.

**8. Active U.S. leadership in international efforts to address safety, non-proliferation, and security concerns.**

As more nations consider pursuing nuclear energy or expanding their nuclear programs, U.S. leadership is urgently needed on issues of safety, non-proliferation, and security and counter-terrorism. From the U.S. perspective, two points are particularly important: First, with so many players in the international nuclear technology and policy arena, the United States will increasingly have to lead by engagement and by example. Second, the United States cannot exercise effective leadership on issues related to the back end of the nuclear fuel cycle so long as its own program is in disarray; effective domestic policies are needed to support America's international agenda.

**Prompt Development of Storage and Disposal**

Our Commission viewed these eight recommendations as an integrated set, which would be most effective if implemented as a complete package. But given the focus of today's hearing, I would like to delve deeper into our recommendations concerning prompt development of both repositories and consolidated storage facilities. While we recommended that this be done using a consent-based approach to siting, let me make it clear again that we were directed by the Secretary of Energy *not* to serve as a siting body, so we did not evaluate Yucca Mountain or any other location as a potential site for the storage of spent nuclear fuel or disposal of high level waste, nor did we take a position on the Administration's request to withdraw the Yucca Mountain license application. Instead, we recommended what we regard as a sound waste management approach that can lead to the resolution of the current impasse; an approach that neither includes nor excludes Yucca Mountain as an option for a repository and can and should be applied regardless of what site or sites are ultimately chosen to serve as the permanent disposal facility for America's spent nuclear fuel and other high-level nuclear wastes.

Consistent with this position, our final report concluded that, "The approach laid out under the 1987 Amendments to the Nuclear Waste Policy Act—which tied the entire U.S. high level waste management program to the fate of the Yucca Mountain site—has not worked to produce a timely solution for dealing with the nation's most hazardous radioactive materials." At this point, with key decisions by the courts and the NRC still pending, the future of the Yucca

Mountain project remains uncertain, and the 1987 Amendments made no provision for an alternative path forward if Yucca Mountain proves untenable for any reason. Consequently, in view of the stalemate over Yucca Mountain and the fact that under current law, the United States will need to find a new disposal site even if Yucca Mountain goes forward, a main focus of our policy recommendations was “Prompt efforts to develop one or more geologic disposal facilities.” We concluded that site identification, characterization, and licensing for a geologic repository using the consent-based approach we recommended might be accomplished in 15 to 20 years, i.e. by 2030-2035 if we do not continue to delay. I should note here that the Administration’s spent fuel management strategy, developed in response to the Commission’s recommendations, envisions a longer timeframe with a repository put into operation by 2048. Based on other consent-based experience, it may be possible to get the job done sooner than that.

As a complement to a repository, to provide earlier acceptance of spent fuel and other benefits to the operation of the waste management system even after a repository is available, we also recommended “Prompt efforts to develop one or more consolidated storage facilities.” We concluded that a notional timeframe for siting and developing a consolidated storage facility would presumably be shorter than that for a repository, perhaps on the order of 5 to 10 years. I should note here that the Administration’s strategy, developed in response to the Commission’s recommendations, envisions a similar timeframe with operation of a pilot storage facility in 2021 and a larger-scale facility in 2025.

These recommendations should not be viewed as an “either-or” alternative to Yucca Mountain, but rather as a restoration of the much broader and robust approach to siting and operating storage and disposal facilities that existed prior to the 1987 Amendments, so that the ability of the US to meet its waste management obligations does not depend entirely on the fate of a single site.

Let me spend a few minutes discussing the importance of moving ahead with interim storage in parallel with work on a repository.

I believe, as did the Commission, that siting and developing one or more consolidated storage facilities would improve prospects for a successful repository program. First, the technical and institutional experience gained by siting, testing, licensing, and operating a consolidated storage facility, as well as planning for and executing a concurrent transport program, would greatly benefit repository development and operation, especially because all the activities involved (apart from those uniquely associated with underground disposal) would be the same. In addition, consolidated storage would provide the flexibility needed to support an adaptive, staged approach to repository development recommended as early as 1990 by the National Academy of Sciences and endorsed in our report. A consolidated facility would allow federal acceptance of spent fuel to proceed at a predictable, adequate and steady rate independent of the status of the repository—both before one is available and when it is in operation.

### Impact of Consolidated Storage Waste Management System Costs

The BRC looked in some detail at the concern that consolidated storage could increase overall waste management costs. Because of the importance of this issue, the BRC commissioned an expert review of estimates of the cost of providing consolidated storage based on analysis of eight studies of this subject published since 1985.<sup>1</sup> I would like summarize a few key findings of that analysis today and submit the full report for the record to provide answers for any detailed questions you might have.

One of the most useful observations of this analysis is that the development of one or more storage facilities does not require, or even imply, an irreversible commitment to any particular long-term plan. All of the capabilities that would ultimately be desirable do not have to be developed at once, particularly since it is not clear at this time exactly what features will be needed over the many decades that such a facility or facilities would be in operation. A storage facility or system of facilities can be undertaken in a stepwise manner, as the need for expansion of capacity and capability becomes clearer, and as technological and other as-yet-unforeseen developments emerge. As the study of storage costs pointed out:

“Regardless of what decisions are made today, leaders in future years will have the opportunity to revise implementation strategies. Today’s decisions can increase the options available in the future, but do not prevent future modifications in light of changed circumstances. *Conversely, future decision makers finding themselves in need of centralized storage cannot implement the option if the developmental work has not been completed.*” (Emphasis added)

While the study concluded that there are many uncertainties in attempting to estimate the long-term costs of consolidated interim storage, the initial cost to site, design, and license a storage facility is relatively low (in the range of \$50 to \$100 million), so that the money put “at risk” in giving future decision makers the option to proceed with construction and operation of a storage facility is small compared to the potential benefits from having that option available. While appreciable, these are small levels of commitment from the perspective of the overall spent fuel management program. At the same time, the study identified circumstances in which centralized storage facilities could lead to total nuclear waste management system savings on the order of billions of dollars. Siting, licensing, building and operating a storage facility with even limited initial capabilities would substantially resolve uncertainties about the costs and time required for these activities, including associated transportation needs, thereby providing a firmer basis for future decision-making with regard to potential expansion.

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<sup>1</sup> Cliff W. Hamal, Julie M. Carey and Christopher L. Ring, “Spent Nuclear Fuel Management: How centralized interim storage can expand options and reduce costs,” May 16, 2011, available at [http://brc.gov/sites/default/files/documents/centralized\\_interim\\_storage\\_of\\_snf.pdf](http://brc.gov/sites/default/files/documents/centralized_interim_storage_of_snf.pdf).

In fact, it appears that direct cost considerations alone may provide a compelling reason to move stranded spent fuel as quickly as possible to even a limited initial consolidated storage facility. The review of interim storage casts found that the operation and maintenance costs for spent fuel storage at shutdown sites range from \$4.5 million to \$8 million per year per site, compared to an incremental \$1 million per year or less when the reactor is still in operation. Even assuming no further change in security requirements at shutdown sites, these cost estimates suggest that the savings achievable by consolidating stranded spent fuel at a limited centralized facility would be enough to pay much or all the cost of that facility. Consolidation would also allow any new safety or security measures that might be required in the future to be implemented more cost-effectively.

With these findings in mind, the Commission concluded that it would be prudent to pursue the development of consolidated storage capability without further delay, recognizing that there will be an opportunity to make course corrections later as needed.

#### **Views on the Administration's Strategy**

Development of consolidated storage capability was one of many of the Commission's recommendations incorporated into the Administration's January 2013 Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste. The Subcommittee asked that I provide my personal views on the Administration's strategy. On balance, I was pleased to see that the Administration's strategy embraces the spirit of the Blue Ribbon Commission's recommendations, from supporting a consent-based siting process and establishing a new waste management organization to conducting R&D on advanced fuel cycles. As noted earlier, the Administration's projected timeframe for establishing consolidated storage capability is generally consistent with the Commission's findings, though the Administration projects that development of a repository will take a decade-plus longer than the Commission believed is achievable.

I must say that I was disappointed, however, that the Administration's strategy does not adopt the non-legislative funding proposals included in the Commission report, in which we said,

“The Administration should work with the appropriate congressional committees and the Congressional Budget Office to reclassify receipts from the nuclear waste fee as discretionary offsetting collections and allow them to be used to offset appropriations for the waste program.”

Instead, the Administration recommends that all changes to the waste fee process be made legislatively. While legislation will eventually be required to fully implement the Commission's recommendations, we saw near-term non-legislative action as a valuable way for the Administration to signal seriousness of intent on the nuclear waste issue. In my view, the Administration has missed an opportunity here. But all told, the Administration's strategy is considerably better than the status quo.

### Getting Started

Let there be no doubt that the status quo is unacceptable. We need prompt action to resume our federal nuclear waste management program. And as we pointed out in our report, work toward a consolidated storage facility can begin immediately under the existing provisions of the Nuclear Waste Policy Act, which authorize the federal government to site, design, license, construct, and operate a monitored retrievable storage facility. According to a legal analysis performed for the BRC, which I would like to submit for the record,<sup>2</sup> further legislative action would not be required prior to the designation of a storage site (and potentially not until the construction phase), at which time Congress would need to amend the Act to allow construction to go forward independent of the status of a permanent repository.

As with developing disposal capability, the critical challenge for consolidated storage will be finding a site or sites. Because the technical requirements for this type of facility would be less demanding than for a repository, finding a suitable location with an accepting host community may be less difficult, particularly if it is accompanied by attractive incentives. The Commission heard testimony indicating that potential host communities, states and tribes would be willing to participate in an open process that engages affected constituencies from the outset and gives them actual bargaining power. Nevertheless, the potential difficulty of siting consolidated storage and the need for a thoughtful approach to this task must not be underestimated. That is the reason that our first recommendation is for a new, consent-based approach to siting future nuclear waste management facilities. While there is no certainty about how long such a process might take, the only way to find out is to try it.

We must couple this siting effort with a renewed initiative to communicate broadly about the benefits and risks associated with the long-term management of spent fuel and high-level waste. In particular, I believe we must communicate effectively about the steps that are taken to ensure safety in the transport of radioactive wastes. During my service on the Commission I learned of the outstanding track record accumulated over decades of safe spent fuel shipments in the U.S. I firmly believe that an effective outreach program is essential to building public confidence that spent fuel and high-level radioactive wastes can be safely shipped, stored and disposed in the U.S.

Finally, let me call attention to the importance of giving the waste program access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management. Failure to do so could undermine key recommendations of the Commission. For example, the parallel storage and disposal programs we recommend could be in competition for limited funds instead of being mutually supportive, and a consent-based siting process that provides assurances to host

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<sup>2</sup> Van Ness Feldman authorities memo



communities that a storage facility or repository will be a positive asset could be undermined if access to a source of funding for promised benefits is not assured.

In closing, let me thank you for this opportunity and reaffirm that I will be pleased to work with the Subcommittee in any way that we can to help put the U.S. high-level nuclear waste management program back on a path to success.

Mr. FRELINGHUYSEN. Ms. Eisenhower thank you very much for your testimony.

Dr. Rodney Ewing. Good morning.

Dr. EWING. Chairman Frelinghuysen, Ranking Member Kaptur, and distinguished members of the Subcommittee, good morning.

Mr. FRELINGHUYSEN. I suggest you move your mic up a little closer to you so we can hear you. Thank you.

Dr. EWING. Thank you.

Thank you for inviting me on behalf of the Board to comment on these important issues from the Board's technical perspective.

My full statement has been submitted for the hearing record. During the time that I have allotted, I will briefly discuss some of the important points from the written statement.

First and most important is to affirm that there is a broad scientific and engineering consensus that a deep mined geologic repository is an appropriate and safe method for the isolation of spent nuclear fuel and high-level radioactive waste from the environment.

Internationally, deep mined geologic disposal is the policy of most countries. Further, a geologic repository will be needed for high activity waste disposal in the U.S. for any realistically envisioned future fuel cycle.

Therefore, the top priority for us all is to get the U.S. on a path towards geologic disposal.

Site selection and characterization will take substantial scientific and engineering effort. In parallel, however, there also must be a strong and continuing engagement with the affected public, including local communities, the state, and Native American tribes.

The challenge of the consent-based process is to blend the scientific and engineering requirements with continuous public engagement. In the U.S., the path to achieving this goal remains to be defined.

A detailed look at international experience with consent-based programs as compiled in the Board's Experience Gained Report of 2011 presents a nuanced picture of successes and failures in this endeavor. It is clear that the simple label, consent-based, does not in and of itself ensure success. Certainly, culture and government structure also play an important role, and to the extent that these are not the same as in the U.S., then the lessons from abroad may not be applied directly here in the United States.

Still, some common themes emerge from the experience of nuclear waste disposal programs around the world and in the U.S., and from my perspective, some of the most important of these are: first, there should be full engagement of the affected parties, and this engagement takes time and requires program continuity. And most importantly, program credibility.

Second, there should be a well articulated technical basis for the selection of the site and the design of a repository. And finally, the basis and strategy of the case for safety must be accessible to the broader technical community as well as the public, particularly the affected public.

Perhaps the most relevant and useful experience for the United States is that of the Waste Isolation Pilot Plant in southeastern New Mexico, which is the only operating deep mined geologic re-

pository in the world. Transuranic radioactive waste generated by defense programs is disposed of at WIPP. I served as a member of a committee of the National Research Council from 1984 to 1996 that continuously reviewed the WIPP project, and I lived in New Mexico through the process. So I had a front row seat from which to watch the evolution of the WIPP project.

In my view, many factors contributed to the successful opening of the WIPP facility, but some of the important factors include: there was a continuous independent, senior level scientific and engineering review in a public forum provided by the National Academy of Sciences through the National Research Council's WIPP Committee. This was one of the longest standing committees in academy history. Typically, open meetings were held twice a year, many of them in New Mexico. Members of the Committee had time to develop a detailed understanding of the project, and in some cases their involvement was longer than some of the program managers.

There was continuous technical review by the state of New Mexico. The Environmental Evaluation Group of the state was a constant reviewer of technical issues, many of which were presented then to the academy committee, again in a public forum. The local community of Carlsbad was very involved, not only as proponents for WIPP, but also as serious and critical observers of the DOE program. Nongovernment organizations were very active, providing both a technical and political perspective.

There was continuity in the repository program. Some scientists and engineers spent a major part of their careers working on WIPP or related projects, and the chief scientist for 25 years, Wendell Weart, was an articulate spokesman for the project and interacted effectively with technical audiences as well as the public.

Finally, there were differences between the WIPP in New Mexico and the Yucca Mountain projects in the regulatory approach. EPA is the regulator for WIPP, while the NRC is the regulator for the YUCCA Mountain project. I suggest that the impact of these differences should be examined as we go forward. One important point in this regard is that the regulatory period for WIPP is 10,000 years, while that of Yucca Mountain is one million years.

In summary, an important lesson from WIPP and international programs is that ongoing transparent, technical review and oversight is crucial to success and crucial to the consent-based process.

I would be pleased to answer any questions.

[The statement of Dr. Ewing follows:]

**Statement of Rodney C. Ewing, Chairman  
U.S. Nuclear Waste Technical Review Board**

**Before the  
Subcommittee on Energy and Water Development  
Committee on Appropriations  
U. S. House of Representatives  
April 11, 2013**

Chairman Frelinghuysen, Ranking Member Kaptur, and members of the Subcommittee, good morning. My name is Rodney Ewing. I am Chairman of the U.S. Nuclear Waste Technical Review Board. I am also a professor in the Departments of Earth & Environmental Sciences, Nuclear Engineering & Radiological Sciences, and Materials Science & Engineering at the University of Michigan. Thank you for holding this hearing on Nuclear Programs and Strategies. I appreciate being invited to discuss, from the Board's technical perspective, the following questions from the Subcommittee:

1. What do international and U.S. experiences tell us about consent-based siting?
2. What can we learn from Yucca Mountain, technically and otherwise?
3. What is the current thinking and consensus around preferable options for nuclear waste disposal and the siting of a geologic repository?

**About the Board**

Before I address those questions, I would like to briefly describe the Board and its role related to the management and disposal of spent nuclear fuel (SNF) and high-level radioactive waste (HLW).

According to the Legislative History of the Nuclear Waste Policy Amendments Act (1987), which established the Board, the Board was created to be a source of objective, expert technical and

scientific advice to Congress and the Secretary of Energy on nuclear waste issues and to review the technical and scientific validity of U.S. Department of Energy (DOE) activities related to implementing the 1982 Nuclear Waste Policy Act (NWPA), including the packaging, transportation, and disposal of SNF and HLW. The Board reports its findings, conclusions, and recommendations to Congress and the Secretary of Energy.

The Board prizes its independence and objectivity. The process for nominating and appointing Board members underscores and ensures the nonpolitical character of the Board; its 11 members are nominated by the National Academy of Sciences (NAS) solely based on their eminence and expertise and appointed by the President. I should note that the current Board is relatively new; all but three of the members were appointed this past September. The remaining three of us have been on the Board for less than two years.

The current focus of the Board's activities is the evaluation of technical and scientific work that DOE will undertake to implement its recently announced "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste." In particular, the Board will review DOE's disposal-related research that was noted in the Strategy, such as evaluating whether direct disposal of existing storage containers used at utility sites can be accomplished in a variety of geologic media; evaluating various types and design features of back-filled engineered barriers systems and materials; evaluating different types of geologic media for their impacts on waste isolation; evaluating thermal management options for various geologic media; and developing a research and development plan for deep borehole disposal. The Board also reviews DOE's work related to the disposal of DOE-owned SNF and HLW. We will be gathering information on that topic at a meeting, which will be held at Hanford next week.

In addition to the work I just described, the Board is engaged in analysis of the following topics that we believe will provide useful technical and scientific information to program managers and decision-makers in Congress and at DOE who are involved in developing nuclear waste management policies.

- Office of Legacy Management's Preservation of Data and Information from the Yucca Mountain Project
- Consent-Based Repository-Siting Process: International Experience and Lessons Learned
- The System-Wide Implications of Repackaging SNF Currently in Dry-Storage at Nuclear Utility Sites
- A Survey of DOE-Owned SNF
- Issues Associated with Deep Borehole Disposal of SNF
- International Experience: Update and Expansion of the Board's Previous Report, *Survey of National Programs for Managing High-Level Radioactive Waste and Spent Nuclear Fuel*

I will now turn to the questions posed by the Subcommittee.

#### **Questions from the Subcommittee**

My responses to the Subcommittee's questions are based primarily on information provided in three Board publications: *Survey of National Programs for Managing High-Level Radioactive Waste and Spent Nuclear Fuel*, issued in October 2009; *Experience Gained From Programs to Manage High-Level Radioactive Waste and Spent Nuclear Fuel in the United States and Other Countries*, issued in April 2011; and *Technical Advancements and Issues Associated with the Permanent Disposal of High-Activity Waste*, issued in June 2011. Here I should call attention to the

fact that the Board as currently constituted was not involved in the development of any of the reports. I will, therefore, update or supplement the report material from my own experience and from Board analyses or evaluations that are currently underway. As I mentioned earlier, the *Survey Report* will be updated, as necessary, to reflect current developments and changing circumstances in international programs.

I will address the questions in the order they were presented by the Subcommittee:

*Question One: What do international and U.S. experiences tell us about consent-based siting?*

In general, most national programs for siting a deep-mined geologic repository for SNF and HLW are attempting to use some form of consent-based siting process – for very good reasons, but with varying degrees of success. As has been learned from siting efforts in this country, not having the consent of the affected units of government at the potential host site, including the state, community, and Native American Tribe(s) can create problems that delay or stop the process altogether. But using a consent-based process does not guarantee that a repository will be successfully sited, as was most recently demonstrated by the experience in the United Kingdom that I will discuss in more detail later in my testimony.

In the last 40 years, roughly two-dozen efforts to identify or create processes for identifying potential repository sites have been initiated in the United States and other countries. Of those, only three have identified a potentially suitable site *and* are still on track. In no case has a license been issued to construct a deep-mined geologic repository for high-activity radioactive waste by the responsible regulatory authority.

I will summarize briefly the experiences of some of the countries that are attempting to site a deep-mined geologic repository for the disposal of SNF and HLW.

*Sweden* – Perhaps the most encouraging example of the efficacy of a consent-based siting process is the approach used in Sweden. After an earlier siting effort failed, in 1992, the Swedish Nuclear Fuel and Waste Management Company (SKB) invited approximately a dozen Swedish communities to participate in a process meant to explore their interest in hosting a repository for high-activity waste. At the end of a very extensive engagement process, two municipalities, Oosthammar and Oostkarshamn, signaled that they were prepared to host such a facility. SKB ultimately selected Oosthammar.

*France* – Early on, two French communities, one with a clay site and one with a site in granite, stepped forward to host an underground research laboratory with the understanding that, if the geologies proved suitable, a repository might be located there. However, the granite formation proved technically unsuitable for repository development and no other volunteer community with a granite site was found. In 2006, Parliament designated an area near Bure in Meuse/Haute Marne as the repository site in clay. It is interesting to note, however, that when the National Radioactive Waste Management Agency (ANDRA), called for volunteers to host a separate repository for long-lived, intermediate-level waste, several communities in the same province as Bure declined.

*United Kingdom* – In 2006, the United Kingdom approved a new approach for developing a repository, which included inviting willing communities to express interest in hosting such a facility. Several borough and county councils near the Sellafield reprocessing site in West Cumbria formed a partnership to investigate the possibility of participating. In January 2013, the local authorities voted on whether to proceed to the next stage in the process. Although the Borough Councils in Copeland and Allerdale voted overwhelmingly to move forward, the Cumbria County Council rejected the proposal. Immediately after the County Council vote, the UK Department of



Energy and Climate Change announced that it was halting all activity related to siting a repository in Cumbria.

*Canada* – A promising national consent-based initiative is unfolding in Canada. Adopting a deliberate and careful approach to understanding the views of Canadians, especially Canada's aboriginal people, the Nuclear Waste Management Organization (NWMO) put forward a plan for adaptive management of Canada's high-activity waste. NWMO is working with twenty-one communities that have expressed interest in learning more about the implications of hosting a deep-mined geologic repository.

*Japan* – In sharp contrast to the Canadian experience, more than a decade ago, Japan's Nuclear Waste Management Organization (NUMO), called for volunteer communities to participate in a stepwise repository-siting process. Although the mayor of one southern Japanese town accepted NUMO's offer, opposition quickly developed at both the local and prefecture levels. The mayor was recalled, and no other community has come forward since. After the damage caused to the Fukushima-Daiichi reactors by last year's earthquake and tsunami, the prospects for volunteers coming forward now appear to be even slimmer.

*Switzerland* – In Switzerland, the typical siting approach of starting with a call for volunteers has been reversed. The government authority first identified five regions where the Opalinus clay might be suitable for locating a repository. Now, in the plan's second phase, discussions are under way with communities in the regions to determine if any of them are prepared to host a repository. Ultimately, the Swiss Federal Government will decide where a repository will be sited, but that decision could be overturned by a national referendum.

*Germany* – In the 1970s, the State of Lower Saxony invited the German Federal Government to develop a repository in salt near the community of Gorleben. That expression of

interest aroused considerable controversy nationally. Although the site is still under consideration, 35 years later there is no decision about whether or not to proceed with development of a repository there.

*United States* – In the U.S., the experience of the *Nuclear Waste Negotiator* may be especially relevant because that effort was truly consent-based. The Negotiator was given authority to search for a voluntary host for a storage facility or a permanent repository site and to negotiate a benefits package with any acceptable incentives. Approval by act of Congress would be required to complete the process. Some local communities expressed interest, but the states in which they were located prevented them from pursuing an agreement with the negotiator. Some Native American Tribes sought agreements, but in 1995, funding for the Office of the Negotiator was eliminated by Congress. It is not clear what factors would lead to a different outcome if that effort were reinitiated today.

The experience of the *Waste Isolation Pilot Plant* (WIPP) also is instructive when looking at consent-based programs for siting nuclear repositories. This is a subject I know about from personal experience: A committee of the NAS National Research Council continuously reviewed the WIPP project for several decades, and I was a member of that committee from 1984 to 1996. During that time, I lived in New Mexico, having become a member of the faculty at the University of New Mexico in 1974. As a result, I had a front row seat from which to observe the evolution of the WIPP project.

The WIPP facility in New Mexico is the only operating deep-mined geologic repository for radioactive waste in the world. The transuranic-contaminated (TRU) radioactive waste disposed of at WIPP is very different from the SNF and HLW that was intended for disposal in a repository at Yucca Mountain. The regulator also was different; EPA regulated the WIPP site, while the NRC is

responsible for Yucca Mountain licensing. The siting experience was different, as well. In a 1957 report, the NAS identified salt formations as the “most promising” medium for the long-term management of HLW. In the 1970s, municipal leaders in Carlsbad, New Mexico, who were facing a decline in the local potash industry, advocated strongly for a site near their town to be considered as the location of a repository for TRU waste. Congress authorized the development of WIPP and directed DOE to enter into a “consultation and cooperation” agreement with the State of New Mexico. The State created the Environmental Evaluation Group (EEG) to advise on health and safety effects of the proposed repository and to ensure that technical issues were rigorously addressed. Despite its inability to enforce its recommendations, the EEG did prompt changes in DOE’s plans. Nonetheless, DOE’s decision to proceed with WIPP was challenged by the state and non-government organizations until the passage of the WIPP Land Withdrawal Act in 1992. The State of New Mexico’s cooperation has depended, at least until now, on an agreement that precludes the disposal of HLW and SNF at the facility or near the site, and the Land Withdrawal Act includes a provision that limits WIPP’s mission to the disposal of TRU waste. However, Carlsbad’s leaders have expressed considerable interest in expanding the facility’s mission.

The important observations to be made about these national programs may be that what characterizes them most is their variety and that there is no consistent formula for success. In some cases, efforts to identify candidate sites have focused from the beginning on specific host-rock formations dictated by a country’s geology or land-use patterns, by a view that particular host-rock formations possess distinctive advantages, or a combination of these factors. In other cases, countries use qualifying and disqualifying conditions to determine the suitability of a site. In addition, a country can evaluate sites serially or in parallel.

Since the early 1990s, nations other than the United States increasingly have developed approaches that empower local jurisdictions. How power is distributed among the affected units of government can be very consequential, as demonstrated by the situations in Japan, Germany, Switzerland, the United Kingdom, and the United States. Experiences in the United States and other nations also suggest that communities already hosting nuclear facilities and communities where benefits might make a significant economic or social difference may be especially receptive to being considered as a candidate repository site.

An important lesson that can be taken from the experiences of national programs, and in particular from the experience of the WIPP facility in the U.S., is the importance of ongoing independent technical review and evaluation. It is not clear whether without such oversight a consent-based process could be successful in this country, regardless of whether it was conducted by DOE or by another organization inside or outside the government.

Question Two: *What can we learn from Yucca Mountain, technically and otherwise?*

Given the Board's technical and scientific mandate, I will focus first on some of the technical and scientific lessons that can be taken from the Board's June 2011 "Technical Advancements and Issues" Report, which looked at the technical and scientific experiences of the Yucca Mountain Program (YMP) and other programs world-wide:

- A variety of geologies can be viable candidates for a repository, including intrusive or extrusive igneous rocks (e.g., granite and tuff), metamorphic (e.g., basement rocks of the Canadian Shield), and sedimentary rocks (e.g., salt and clay).
- There may be alternatives to the "one-size fits all" approach used by the Yucca Mountain Program for the disposal of SNF and HLW.

- Expect surprises in any underground site investigation.
- Engineered barriers can delay reliance on the waste-isolation capabilities of the natural system.
- In general, in the presence of water, the higher the temperature, the more rapid will be the degradation (corrosion) of the waste package.
- When compared with oxidizing environments, emplacement of high-activity waste in reducing environments has important advantages that enhance long-term isolation of the waste from the environment.
- Natural analogs were invaluable for evaluating the Yucca Mountain site. Natural analogs should be identified and studied early as part of the site-characterization process.

Some non-technical lessons from the report include:

- A deep-mined geologic repository for the disposal of SNF and HLW is needed under all realistically foreseeable circumstances.
- An implementing waste management organization that has continuity of funding, management, and personnel is very important.
- Undue delay makes it difficult to implement a concept of waste management that depends on institutional stability.
- Implementing a permanent repository could take decades.

I would add that, as mentioned earlier, successfully siting a repository for disposal of SNF and HLW is difficult or impossible without the consent of the affected units of government that will

be hosting the facility. To be acceptable to the affected units of government, the technical suitability of the site also must be established.

Question Three: *What is the current thinking and consensus around preferable options for waste disposal and siting?*

*Repository Options:* The international consensus, confirmed by the Blue Ribbon Commission on America's Nuclear Future (BRC) and many previous reports from national and international organizations, is that disposal in a deep-mined geologic repository is a workable and safe solution for SNF and HLW. Regardless of the fuel cycle selected, some fraction of the nuclear waste generated will require geologic disposal.

There are other options for disposal of SNF and HLW in addition to deep-mined geologic disposal, including deep borehole disposal of SNF, HLW, or "orphaned," special waste streams. In its final report, the BRC recommended that DOE should undertake studies on the use of deep borehole disposal for some forms of waste that essentially have no potential for reuse.

The Board is preparing a fact sheet and letter on this subject, and its analysis so far indicates that deep borehole disposal, if it proved to be physically feasible, might have some advantages for disposing of SNF and HLW that has little potential for reuse. However, vitrified waste as it currently exists in metal canisters filled with glass may be too large for the boreholes envisioned for deep borehole disposal. Also, commercially generated SNF and DOE-owned SNF is stored in canisters with a wide-range of sizes and shapes, so repackaging into smaller canisters also would be required for that waste. There are other daunting challenges associated with deep borehole disposal related to developing new drilling technologies, the emplacement and effective sealing of waste packages at great depth, and the need to address the potential retrieval of the emplaced waste.

Because of the present uncertainties associated with deep-borehole technologies, the Board recommends that deep borehole research and development not distract the U.S. program from vigorously pursuing the siting and characterization of a deep-mined geologic repository.

*Repository-Siting* - A top legislative priority should be to establish a clear path for a consent-based repository-siting process. The Board presently is developing its own recommendations on this topic. Already, from my personal perspective, a few basic requirements are clear:

1. There must be a set of technical criteria by which sites are evaluated.
2. There should be a clear statement of how all affected units of government (e.g., local community, Native American Tribe, and state) will be engaged in the consent-based process.
3. There should be a clearly understood process by which the affected units of government can opt out of the siting process.
4. There should be a clear understanding of the time after which the affected units of government can no longer withdraw their consent.

#### **DOE Preservation of Yucca Mountain Data and Documents**

Finally, I want to update the Subcommittee on an upcoming Board report on DOE's efforts to preserve Yucca Mountain data, documents, and other materials. The report is both appropriate to the subject of the hearing and is being drafted by the Board as the final phase of a review activity that was prompted, in large part, by direction from the Appropriations Committee.

For almost 30 years, DOE studied the Yucca Mountain site. In 2010, when the Yucca Mountain program was shut down, responsibility for archiving and preserving Yucca Mountain scientific and engineering information was transferred to the DOE Office of Legacy Management (LM).

The Board began evaluating DOE activities related to archiving and preserving Yucca Mountain data and information in 2010, as part of its ongoing technical and scientific review. The following year, the Report accompanying the Fiscal Year 2012 Energy and Water Development Appropriations bill directed the Board to “give support to” DOE as it archived and preserved scientific data, documents, and other materials from the YMP.

In accordance with its mandate and consistent with the Committee’s direction, the Board has conducted a review of DOE’s data-preservation activities, including a limited number of retrieval spot checks, and will soon send its report to Congress and the Secretary. The report is currently being finalized; the following is an “unofficial” overview of the Board’s findings:

- Yucca Mountain documents have been preserved and can be accessed and retrieved.
- With significant time and effort, LM personnel can search and retrieve relevant e-mail records.
- LM does not have the capability to load and execute most of the analytical software used on the YMP.
- Some boxes of YMP records being stored by LM contain physical objects, but the inventories of the contents vary in how detailed they are. Consequently, it is unclear what measures might be needed to preserve them or to create searchable databases for the objects.
- LM has used approved NARA schedules to identify what YMP records should be preserved permanently and what records should be preserved temporarily.
- The general public can access written records held by LM, but only through a Freedom of Information Act request.

The Board plans to issue its report in the near future.



**Summary**

To summarize some key points from my testimony, I would observe that not using a consent-based approach for repository siting can slow the process or lead to delay or failure, but using a consent-based process does not guarantee that a repository will be successfully sited. Programs in other countries are using a variety of consent-based approaches, with mixed results. Deep-mined geologic disposal remains the approach that is being pursued by most of the countries with nuclear waste programs, worldwide, and a deep geologic repository will be needed regardless of the fuel cycle option selected. The only operating deep-mined geologic repository in the world for disposal of radioactive waste is the WIPP facility in New Mexico, and important lessons can be taken from the development of that facility. Finally, ongoing, independent technical oversight of the activities undertaken by the implementer of a consent-based repository-siting program is crucial, regardless of whether the implementing entity is a government agency, a non-governmental organization, or a federal corporation.

Thank you very much. I will be happy to respond to questions.

Mr. FRELINGHUYSEN. Thank you, Dr. Ewing, for your testimony.

Mr. Rusco, there seemed to be quite a discrepancy between your ballpark figure of \$15 billion and that of Mr. Lyons, who obviously we have deep respect for, but why such a gap here?

Mr. RUSCO. I think it is really quite simple. Well, the main difference is that we are looking at dollars in today's terms, so you know, we are adjusting for inflation. A billion dollars 20 years ago is worth more than a billion dollars today.

Mr. FRELINGHUYSEN. So you are basing the \$15 billion on an inflationary factor?

Mr. RUSCO. Yeah.

Mr. FRELINGHUYSEN. You are not basing it on all the accounting that you have done relative to the costs?

Mr. RUSCO. We added up all the costs over time. And we just adjusted it to today's dollars.

Mr. FRELINGHUYSEN. To both you, Ms. Eisenhower, and Mr. Rusco, this issue of consent-based. At one point in time the Yucca site was consent-based. There was a host community that agreed. Is that not accurate?

Mr. RUSCO. That is correct. There was some agreement in the small community there about that. Yes.

Mr. FRELINGHUYSEN. Yeah. There was some agreement.

Mr. Simpson raised a question earlier on what does interim storage buy us? I would like to know what your opinion is here. What does it buy us?

Ms. EISENHOWER. Well, thank you. First of all—

Mr. FRELINGHUYSEN. How does it really help the situation given the fact that we obviously have a potential use of something? But where are we going with interim storage?

Ms. EISENHOWER. Yes. Thank you. If you would allow me also just to add one thing to the consent-based.

Mr. FRELINGHUYSEN. Jump in.

Ms. EISENHOWER. One of the things that I thought was absolutely riveting in the Commission sessions was the eagerness of the community around Yucca Mountain to see that project go forward. But what we discovered was what somebody referred to as the donut effect, which is the local community could be highly in favor of this but the state is against it. And I think this is going to be a very big issue for resolution, which is one of the reasons I emphasized the transportation thing so much in my comments because that seemed—

Mr. FRELINGHUYSEN. Las Vegas did not want to have trucks rolling through. I mean, let us be—

Ms. EISENHOWER. Exactly. But that is why a fact-based approach to looking at the transportation is important.

With respect to your other question—I am sorry. Could you just—

Mr. FRELINGHUYSEN. What does interim storage buy?

Ms. EISENHOWER. Yes. Interim storage. I think, first of all, interim storage offers a lot. It offers a kind of flexibility. As we have already described, it will take some time, not only to site more than one permanent repository, but we are also under pressure because the federal government has an obligation to move the waste from these reactor sites and it gives us an opportunity to accomplish the

first step. Our commission visited Sweden. It is probably one of the most exciting projects in the world for this project. They had a multi-tiered system. They moved everything into consolidated storage and then the next step was the building of a repository which they have now done. So it is part of a phased project.

At the same time, I would offer it as a kind of flexibility for seeing where the technology and other issues go. It could be at some point that various estimates or various energy challenges we may face, may not pan out over time. We may want to look at the use of reprocessing or recycling spent fuel, depending on what technology is available. So it gives us all kinds of flexibility both with respect to building a long-term permanent repository and also having the flexibility to make changes and arrangements as we go through this multi-tiered process.

Mr. FRELINGHUYSEN. Well, thank you.

Interestingly enough, Mr. Rusco, maybe you know this. The Department of Energy's Office of Civilian Radioactive Waste Management estimated in 2008 that the cost of transporting spent fuel to Yucca would be more than \$19 billion. If you have interim storage you could double that cost.

Mr. RUSCO. I think that is one of the big challenges. There are a couple big challenges of interim storage, and the first, of course, is just, you know, can you build it? And how long will it take?

Mr. FRELINGHUYSEN. It is a little difficult to justify spending that much money, even though they appear to have an impeccable record of moving things.

Mr. RUSCO. Exactly.

Mr. FRELINGHUYSEN. That is a lot of money.

Mr. RUSCO. And then moving it essentially twice. If they were not co-located you are moving it twice and that does—

Mr. FRELINGHUYSEN. And lastly, before I go to Ms. Kaptur, Dr. Ewing, did your group find any technical issues with Yucca? Was Yucca an appropriate site? I know you have somewhat endorsed backhandedly the WIPP site, but I am just wondering—

Dr. EWING. And I did not mean to do that. That was an example.

Mr. FRELINGHUYSEN. Well, I know that but you went on at some length and I—we are sympathetic to that.

Dr. EWING. Okay. A relevant example.

Mr. FRELINGHUYSEN. Yeah.

Dr. EWING. The Board in 2002, reviewed in detail the technical basis for the DOE's work in support of the anticipated license application. And just to quote from their report, at that time they said, "At this point, no individual technical or scientific factor has been identified that would automatically eliminate Yucca Mountain for consideration as a site for a permanent repository."

Mr. FRELINGHUYSEN. So you stand by that?

Dr. EWING. I think that is true. I also would point out that in their review of the work they ranked the quality of the work supporting the technical basis as weak to moderate at that time. And so there are still issues to argue about.

Mr. FRELINGHUYSEN. Weak to moderate but an investment in time and taxpayer money.

Dr. EWING. Right. Certainly.

Mr. FRELINGHUYSEN. But you do not have any technical issues relative to——

Dr. EWING. No, sir.

Mr. FRELINGHUYSEN. Okay. Ms. Kaptur.

Ms. KAPTUR. Thank you, Mr. Chairman, and thank this excellent panel for your work.

Mr. Rusco and Dr. Ewing, in reading between the lines of your testimony, I am thinking about the manner in which the Department of Energy functions, versus the Environmental Protection Agency, in kind of a time warp in a way that seems to have affected this project in my mind. Going back to the '70s and '80s, agency departmental behavior changed with the development of the Environmental Protection Agency. More open hearings, more consultation back and forth. It sounds like going back to when this started, the consultation was very minimal, decisions were made internally according to what you said, Dr. Rusco, or Mr. Rusco, if I am correct in your testimony. Doctor, you talked about the behavior and the consultation that would go on with stakeholders adjacent or within the state in which this might exist.

Could you discuss a little bit more the change in departmental behavior, NRC, EPA, Energy, since the '70s up to the point we are now and the fact that part of what happens here appears to me to be a change in the way that we make public decisions as affects the environment and the public's engagement in that over 40 years. Was there a much more internal set of decisions made? Mr. Rusco, you pretty much said that.

Mr. RUSCO. Definitely, the panel that DOE formed, expert panel to evaluate their process found that they lacked transparency and they had been accused of having basically vague criteria for their initial selections. And these kinds of issues can snowball, especially, you know, there was local support and community support for this project. There turned out to not be state support. We cannot go back and look and see what would have happened had there been a more open process, but a more open process is obviously going to be necessary going forward. You have to educate people about what you are doing and convince them that it is okay or else, you know, you will not find the support.

Ms. KAPTUR. Dr. Ewing, do you have a comment?

Dr. EWING. So my experience with WIPP came before I had any experience for Yucca Mountain, so I had a naive feeling that this is the way it is always done. I think with the EPA as a regulator, and the EPA became a regulator with the Land Withdrawal Act, so it was part of a grand bargain of how we put together regulation and oversight. The state's environmental evaluation group was created at the same time. And one of the characteristics I think of that time was that there was open discussion back and forth. The EPA had a lot of experience dealing with environmental problems, realized the difficulties of long-term predictions, and was willing to consider variations on a theme, that is safe disposal, that taken together would ensure the safety of the site. As time has passed, I think our regulatory framework, in my personal view, has become very prescriptive. And so we have lost the ability to negotiate back and forth about appropriate solutions to very difficult problems.

Also, I would have to say this was in the time of Senator Domenici, a towering figure in the discussions, and so that drove all parties to I would say civilized behavior and moving forward. So.

Ms. KAPTUR. Thank you. Thank you for those comments.

I, in the prior round, had asked a question about whether the sites being evaluated now were near any military facilities. Both the chairman, myself, and our ranking on Defense Approps, Mr. Visclosky, all of us have served on Defense for a long time. And my own view is that just because of the development of global conditions, the domestic concerns about nuclear spent fuel, that the closer we can locate to a military facility to give the public security, the better we are. And I am not saying it has to be on a base, but I am saying it is an additive factor. And I, unlike Mr. Visclosky, have not visited all possible sites. But all I am saying, knowing the public perception in trying to give confidence, it would seem to me that that would be worthy pursuit to solve this for the country. And it would be helpful.

I know that this is not directly related to what we are talking about here, but in terms of the difficulties that some of our commercial nuclear power plants have had, I have been very public in my own state about encouraging disciplined management at the level of the nuclear navy in order to get rigor and better management of facilities that have been heavily fined for a lack of disciplined management. And what has been interesting over the years, and I think one of my greatest accomplishments on the energy side as a member, has resulted in a job path for personnel from the nuclear navy going into the commercial nuclear industry. And I am now finding very excellent people in our commercial companies. And I thought, well, that is good. That is different. It is a good development for the country and for better management of plants. So when I look at this I say to myself, hmm, I think we need to be thinking not just at a Department of Energy and NRC-regulated facility, but we need to be thinking about a discipline giving the public confidence that this will work and they have nothing to fear. Thank you.

Mr. FRELINGHUYSEN. Mr. Simpson.

Mr. SIMPSON. Thank you, Mr. Chairman. Thank you, Susan, for taking the time to serve on the BRC. I know that was a very time-consuming effort, and I suspect it probably did not pay a whole lot.

Ms. EISENHOWER. No.

Mr. SIMPSON. But let us all face it. The problem with Yucca Mountain is not technical. It is political. That is just the reality. It is what it is, and it is what we are going to have to deal with. But I find this question of consent-based siting very interesting. You described it as a donut hole, and that is exactly right. And I think, Dr. Ewing, your description of what happened at WIPP is kind of rosy compared to the difficulty we had of opening WIPP. I have had county commissioners around Yucca Mountain come in that support it and would like to see it move forward. Obviously, the state of Nevada has a problem. In Carlsbad, New Mexico, when they were proposing that, I remember there was a young attorney general named Tom Udall, who was suing the state of New Mexico to try to prevent the opening of WIPP. And now you see Carlsbad. The residents of Carlsbad are very interested in potentially taking

on an interim storage facility. I think Savannah River maybe put a proposal out there. It is not out of the goodness of their heart. They want something. And what they want is economic development, the jobs that it brings, and they want us to pay them for it. I think Savannah River's latest proposal says if we do an interim storage facility in Savannah River, we have to move all of the fuel cycle research to Savannah River. That is beautiful. So we just close down the INL and some other places, but that is going to create some real hassles. That is the type of bidding we are into because I do not know that you are going to find some place where the whole level of government—local government, state government—is going to say, yeah, bring it here.

What are your thoughts on that?

Dr. EWING. May I respond?

Mr. SIMPSON. Yeah.

Mr. FRELINGHUYSEN. Equal time.

Dr. EWING. Right. First, I want to be sure to say I did not mean to paint a rosy picture, but I did pick out the positive highlights. In fact, it took a long time, and in New Mexico there was a donut effect. Northern New Mexico was strenuously against opening WIPP. But over time, with the external oversight and constant discussion, the state fell into line on this. And I note there is a huge, expensive bypass around the city of Santa Fe that was the result of these discussions. And the waste moves around Santa Fe, not through Santa Fe.

Mr. SIMPSON. Well, let me ask you as you are answering that, what do you think the reaction would be in New Mexico now if they decided that they wanted to expand WIPP to be a permanent repository, to put high-level waste there?

Dr. EWING. You would be at the beginning of another long journey. And the first issue would be that the state accepted WIPP, the opening of WIPP, with the understanding that it would not be a repository for spent fuel and high-level waste. So that would be a serious barrier.

Mr. VISCLOSKEY. I am sorry, what did you just say?

Dr. EWING. The opening of WIPP, you know, the state agreeing to this was—part of that agreement is that WIPP would not be used for spent nuclear fuel or high-level waste.

Mr. SIMPSON. The thing I hear most from every community I talk to that is interested in it is that they do not trust the federal government to make interim storage interim, because in the long run they are going to say we got it solved; deal with it.

Ms. EISENHOWER. Maybe I could respond to that. That is one of the considerations that we discussed at length, and the reason for our concluding that a Fed Corp would be a good idea. You know, trust is a very delicate flower, and once it has been bruised it is extremely difficult to restore that. There have been some—we looked at a number of models for Fed Corps and, you know, obviously the composition of this might vary, but it would give the whole process a fresh start.

To your point about there is not a reason that a community does it unless they have something they want, that is probably true, but it also has been the international experience. In Sweden there were significant economic concessions that came to the community that

won the site selection. Even some economic benefits to those who put their names in the hat. But they have had a very successful program.

You might also be interested to know that Canada has had a request for interest process underway up there and they finally had to, from what I understand today, close the series of requests because they had more than 21 possible applications. And they are a bit like this country.

Mr. SIMPSON. Can we ship it to Canada?

Ms. EISENHOWER. Hey.

Mr. SIMPSON. It could be a good headline.

Ms. EISENHOWER. There we go. Yeah.

Mr. SIMPSON. Thank you.

Mr. FRELINGHUYSEN. Mr. Simpson always makes things lively here.

Mr. VISCLOSKY, see what you can do to add onto that.

Mr. VISCLOSKY. I will do my best, Mr. Chairman.

Mr. Chairman, I would start out by again, acknowledging that I have a lot of respect for Dr. Lyons and Mr. Weber. They just happen to be sitting at the wrong place at the wrong time because I have been a member of this Subcommittee for a long period of time and I appreciate the second panel participating as well.

Dr. Ewing, you, in your summary, I thought were very measured, but I thought you made a good point. You said to summarize, I would observe that not using a consent-based approach for repository siting can slow the process or lead to delay or failure. But using a consent-based process does not guarantee that a repository will be successfully sited, talking about the donut hole. I think that is a good point. Okay, you get a community, then you have a problem with the state.

Having calmed down, and recognizing I cannot do anything about the last 26 years, but going forward we are talking about 35 years. And potentially an average of \$400 million a year going out the door. I certainly have a responsibility; we all do. What would be your recommendations—because there is a congressional failure here, too. What can we on this Subcommittee do? What should the Administration be thinking about doing to not use 2048 as a goal and not take 35 years to move this process along as far as consensual siting if that is what it takes, understanding that is not a sure thing, too, from Dr. Ewing's testimony, and I appreciate that.

Do you have any thoughts as to how we can help move this along in a positive fashion; not a kind of vented?

Ms. EISENHOWER. Well, I would just like to very quickly go back to the importance—

Mr. VISCLOSKY. Ms. Eisenhower, are you a Michigan person as well? I know Dr. Ewing is.

Ms. EISENHOWER. I am sorry?

Mr. VISCLOSKY. Are you a Michigan person? University of Michigan person, too?

Ms. EISENHOWER. No, I am not.

Dr. EWING. That is still her opinion, I think.

Mr. VISCLOSKY. I notice a Notre Dame guy. I know he is fine.

Mr. FRELINGHUYSEN. Let us make sure that is struck from the record.

Ms. EISENHOWER. So I would like to say on the 2048 date, I am under the assumption that that is an outside figure. It is very hard to estimate how long this is going to take, but I think the reason the Blue Ribbon Commission was a little bit more optimistic is having studied the international situation, especially looking at countries that were a little bit more like the United States than say France, which has a much more centralized government, that if we gave it a fresh start, if we assure the access to the funds, that this could move along more quickly. Getting access to the funds is important. The \$400 million you are talking about that go out the door, actually, the rate payers have already paid that. So it is not coming out of the Federal Treasury, per se. I mean, this has been dedicated money. And I would like to point out that the polluter pays is the only—nuclear industry is the only energy source that actually pays for its disposal costs upfront. And so I think the public has a right to believe that those resources are going to be there. And if potential host communities believe that those resources are going to be there, too, we might be surprised by how many state and local communities come forward. Thank you.

Dr. EWING. Just to expand on the response, one of the values of the consent-based process, if that were to be the way we would move forward, is education. And if you look at the Canadian experience, in the late '80s they had a strong technical program that finally was deemed not to be acceptable. And so they started from scratch. And when they started over they focused on communication and education, and dealing very slowly and deliberately with the people who would be involved. And I must say at that time I was very skeptical because I thought, well, this is a scientific problem. Let us do the science and move on. But I have to observe now that they have over 20 communities who are interested in being candidates. And they go further. They have taken some communities off the list because of the geology or there are technical issues that do not allow them to go forward. So I think the consent-based process is—the leverage you need or the path forward that would involve educating the public, and that opens the range of possibilities.

The other point I would make is in terms of thinking about legislation, the credibility of the organization charged with this duty is essential. And there I would look to Sweden and the SKB model. They have a single purpose. It is to dispose of waste. It is not to expand the nuclear power industry. It is not to deal with any other issue but disposing of waste. And they are rigorous in following those directions. It is small. SKB now has grown because they are actually doing something, so they have a little over 300 employees. And they have high technical competence. They contract all over the world. They get the world's experts. And they are doing it at a fraction—doing their job at a fraction of what we would be spending annually.

So I think if you have an organization dedicated to this purpose with high credibility that interacts well with the public, that is the foundation of success over the longer term.

Mr. VISCLOSKY. Thank you very much. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. Mr. Nunnelee.



Mr. NUNNELEE. Thank you, Mr. Chairman.

Mr. Simpson raised the issue of interim storage facilities. Of course, as you know, the current U.S. statute says that we do not establish interim facilities until a permanent repository is established. But the Administration's energy policy earlier this year seems inconsistent with that. So, are we not headed down the road that Mr. Simpson described where the interim facilities are actually going to become permanent?

Ms. EISENHOWER. First of all, that is sort of a judgment and I think it goes back to trust and confidence. There may be some kind of soft linkage eventually, but I think we do not have an overall strategy at the moment for how to think about this. That is what was so impressive about visiting other countries on our fact-finding trips—to see that they actually have a full-blown, well thought through strategy that comes in incremental steps. And, you know, I am not sitting on your panel. I am on the other side of the table here, so I am sure there are all kinds of considerations that go with providing at least some sort of linkage as a form of assurance. I do not know whether that is necessary, but I do think that to Dr. Ewing's point, that the right organization to carry this forward could make an enormous difference. An organization that knows how to inspire public confidence and that works hard at that.

Let me also say that there are huge facilities that have grown up around those places in Sweden and in France; these places become kind of nuclear centers. And so there are huge incentives, even on a temporary basis, for these communities to be willing to be considered.

Mr. RUSCO. Could I just add a couple of points?

Mr. NUNNELEE. Sure.

Mr. RUSCO. With regard to WIPP, one of the reasons that WIPP ultimately succeeded is the state got concession from DOE on authority and, for example, the state has the authority to say no to any shipment if they do not think it is sourced correctly or it has—the right steps have been taken. And that gives the state then the confidence, you know, some of the confidence that they cannot become something that was not intended. And I think that that is critical. There has to be some mechanism, and it does not have to be that, but some mechanism to ensure that an interim facility will not become permanent. And that may require some different sphere of control.

Mr. NUNNELEE. I understand you do not sit on this panel. Those that sat on this panel before us did come up with a strategy. It is the law of the land. It is just not being followed. So when can we anticipate from the administration a strategy for temporary storage sites through 2048 or 2047 or 2049? When will we have that strategy?

Mr. RUSCO. In our work we did some estimates of how much time it would take to build an interim facility. Now, this was under the assumption that we are going forward with Yucca and it did not take into account all the social, political, you know, potential for delay. But even without that and in those conditions we think 20 years is not an unreasonable amount of time to build an interim facility.

Mr. SIMPSON. Will the gentleman yield?

Mr. NUNNELEE. Sure.

Mr. SIMPSON. One of the other things that concerns me, frankly, is that when I asked the Department at one of our hearings if the Administration was going to put forth legislation to implement the recommendations of the BRC, they said no, they had no plans to put anything forward. And so is this another Simpson-Bowles Commission where they make recommendations and then we all just kind of wave at it? Or are they going to propose—and I know you are not all from the Administration, but it bothers me that the Administration is not taking the recommendations seriously. It is almost like it is a plan to not have to deal with Yucca Mountain. We have an alternative over here, but we are not going to push it forward. So that is a statement, not a question.

Mr. FRELINGHUYSEN. Mr. Nunnelee, Ms. Eisenhower I think wants to reply to you and Mr. Simpson if that is all right.

Ms. EISENHOWER. Well, I am not a lawyer so I am not going to try and give you an assessment of what is already a legal brief, but I would like to point out again that I have submitted for the record a memo from Van Ness Feldman that indicates that we could actually begin the process of a consolidated storage facility under the existing provisions of the Nuclear Waste Policy Act. And I just wanted to flag that for you. I hope that memo will be of some help to you.

Mr. SIMPSON. Okay. Thank you. Thank you, Mr. Chair.

Mr. FRELINGHUYSEN. Batting cleanup as we approach high noon, Mr. Fleischmann. And then I believe Ms. Kaptur has a comment after you.

Mr. Fleischmann.

Mr. FLEISCHMANN. Thank you, Mr. Chairman. I will be very brief.

I really want to thank the panel so much. I am from Tennessee. I represent Oak Ridge and the Third District of Tennessee. And it is clear. It is clear that we have got this waste at these sites. It is sitting there. We have got to deal with it, and I really appreciate the fact that you all have stepped up to deal with it. And I share the sentiments of the Committee. I think they are concerned about the past and want a brighter future in this regard, and I certainly want to be part of that solution. So I will be brief.

I want to ask one final question. We have touched on this, Ms. Eisenhower. Your testimony cites recent experiences in Spain, Finland, and Sweden as encouraging examples of consent-based siting. Can you elaborate on those experiences? And then I will rest with that.

Ms. EISENHOWER. Yes. I tried to indicate some of the experiences by noting the developments in Canada and Sweden. I was particularly impressed by the Swedish model because as Dr. Ewing pointed out, there is a dedicated company called SKB, which is a Fed Corp for the Swedish government that essentially has this as its mission and absolutely nothing else. So I think that is very heartening. I gather that developments in Spain, though I did not visit there myself, look very promising.

And then if you allow me just to add one other thought here. I think it is important for all of us to ask ourselves what are the alternatives. If we do not find some way to move forward, either—

I mean, how are we going to know unless we try it. And if we do not move forward, we are going to end up accruing huge liabilities for the federal government and finding that we have these orphaned nuclear sites. I visited Maine Yankee. It is really stunning to see this perfectly beautiful piece of real estate no longer has a nuclear reactor but it has its dry cask storage out on a platform being guarded when actually it would benefit hugely from being in some kind of interim or consolidated storage.

And so I think what is impressive just to round up my answer to your question is that these foreign governments have moved forward with some plan. We came to an impasse. We had a Blue Ribbon Commission. We put our hearts and souls into coming up with some ideas that we hope, you know, will at the very least create a vibrant debate about how we can move forward. But the alternatives, the status quo, I do not think is sustainable on any level.

Mr. FLEISCHMANN. Thank you. Thank you all.

Mr. FRELINGHUYSEN. Thank you, Mr. Fleischmann.

Ms. Kaptur.

Ms. KAPTUR. Thank you, Mr. Chairman. I will be brief. On the last round I did not get a chance to ask Ms. Eisenhower a question but I really appreciate your testimony.

Ms. EISENHOWER. Thank you.

Ms. KAPTUR. And the idea of a separate organization to run this is appealing so long as our Committee maintains jurisdiction. And drive. Jurisdiction and drive.

I did want to just place on the record because you get in different audiences, and if we look at the Department of Defense and the number of defense waste cleanup sites that we have, they are extraordinary. And there may be a confluence of interest between the Department of Energy and the Department of Defense if they would bother to map it where we would do a community a favor by cleaning up a defense site that is sitting out there somewhere. And also, it would become the new home for this spent fuel. I do not know where those might be but I have been absolutely astounded when I look at the maps relating to defense cleanup and what we are charged with as a country and proceeding along that path not at a quick enough pace for me.

But I think that that is something to also consider as one looks at ways of solving this problem geographically. And there may be something there. There may not be. But I just put it out there for your thought as you get into different audiences and attempt to help us solve this national challenge. And thank you all very much for your testimony.

Mr. FRELINGHUYSEN. Thank you, Ms. Kaptur.

Mr. Visclosky.

Mr. VISCLOSKY. Thank you, Mr. Chairman. I appreciate the forbearance.

Just, I guess, a question on interim. Understanding that some people oppose interim storage on the theory it takes pressure off of permanent repository and I understand that. Looking forward in proceeding down this road, and I appreciate the legal opinion. One of the reasons I liked law school is you could give the wrong answer but great arguments. You would pass. You would not do well

but you could get out of school. So people could have reasonable differing opinions.

Again, as you put together a program going forward, how do you assuage that concern that, oh, here you go again and we are never going to get to permanent? How could you deal with that question? And if you do not have any ideas now, that is fine. You know where I live if you want to call any of us back.

Ms. EISENHOWER. I will just add to this, this is a description of the status quo. I mean, I think most Americans would agree that, you know, we are not moving forward at all on this. And if it is correct, and I do believe it is, that if people are fearful of the unknown, they are going to feel a lot better when we have some kind of consolidated storage facility on a temporary basis. Right now we have got spent fuel essentially stored in more than 104 places in the country. I think this will actually raise public confidence to let the public know that these are going to be in fewer sites. They are going to be well guarded. They are going to take some pressure off of communities that right now are not happy about, you know, the spent fuel pools and the dry cask storage that is sitting on site. So I think sometimes it is very hard to imagine the future on behalf of people who may not be as knowledgeable about this subject as you are. But I think everybody will agree that the status quo probably is not desirable at all.

Mr. VISCLOSKEY. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. All of us will agree to use your adjective that you are a very impressive panel. I want to thank you for your time and effort in being here today and sharing your knowledge and perspective with us. On behalf of the entire Committee, we thank you and we stand adjourned.

## SUBCOMMITTEE QUESTIONS

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT  
HOUSE COMMITTEE ON APPROPRIATIONS

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### NUCLEAR WASTE PROGRAMS AND STRATEGIES

APRIL 11, 2013

#### Panel 1

*Peter Lyons, Assistant Secretary for Nuclear Energy, DOE*  
*Michael Weber, Deputy Executive Director, NRC*

#### Panel 2

*Frank Rusco, Government Accountability Office,*  
*Susan Eisenhower, former Member, Blue Ribbon Commission*  
*Rodney Ewing, Chair, Nuclear Waste Technical Review Board*

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**SUBCOMMITTEE QUESTIONS: PANEL 1****YUCCA MOUNTAIN****TAXPAYER LIABILITY UNDER NEW STRATEGY**

Subcommittee. Dr. Lyons, one of the least visible impacts of the Administration's Yucca Mountain policy is that the U.S. taxpayer is effectively being taxed for the Department's failure to live up to its contractual responsibility to take spent nuclear fuel off the hands of the private sector. Back in 2006, the Department proposed having Yucca Mountain open by 2017. That was late, but served to keep some of the lawsuits at bay.

When the Administration changed its policy and tried to terminate this project, that situation changed. Your proposed plans would theoretically have a new repository by 2048 — 31 years after Yucca was to open. Now, taxpayers are paying out billions of dollars — or perhaps our deficit is just being driven up more — but since it is being paid out of the non-appropriated "Judgment Fund" at the Department of Justice, it is effectively hidden in the Administration's annual budget.

How much has been awarded by courts out of the Judgment Fund, and how much could additionally be awarded in future cases?

What effect have the Administration's attempts to terminate Yucca Mountain had on the courts' decisions? Have settlements and judgments against the Department increased since the policy change in 2009?

Until it was terminated, Yucca Mountain was scheduled to begin accepting nuclear waste later this decade. The Administration's new plan calls for a large interim storage facility to begin accepting waste by 2025, at the earliest. This means that, in the best case, spent fuel isn't going anywhere until 2025.

What is potential taxpayer liability for DOE failing to meet its contractual obligations from now until that best-case scenario of 2025?

The Department's proposed strategy is to have a permanent repository open by 2048. But what if it ends up being impossible to site an interim storage

facility — which is not entirely unlikely. How much could taxpayers end up paying out of the Judgment Fund for failing to meet contractual obligations from now until 2048?

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DEPARTMENT OF ENERGY TERMINATING AND RESTARTING  
YUCCA ACTIVITIES

Subcommittee. Secretary Lyons and Mr. Weber, as you know, the Administration took steps to terminate the Yucca Mountain licensing process beginning in fiscal year 2010, and expended considerable funding and effort to dismantle the licensing teams. Many members on this Committee and in the House firmly believe this was for political reasons, and that it has created some serious—and unnecessary problems.

How much has each of your two agencies spent on the actual termination of the licensing process?

Mr. Weber. In Fiscal Year 2011, the U.S. Nuclear Regulatory Commission (NRC) obligated approximately \$7.3 million (31 full-time equivalents (FTE) and \$2.1 million for contractor support and travel) of Nuclear Waste Fund (NWF) resources on the orderly closure of the Yucca Mountain license application review, including knowledge capture activities.

Subcommittee. How much would it cost each of your agencies to restore the teams to their fully-active state, if you need to resume the licensing process?

Mr. Weber. The actual cost to resume the review is difficult to estimate since it would depend upon the direction provided by the federal court or the Congress through its appropriations process. However, an estimate based on previous annual budgets suggests that the NRC would need approximately \$25 million (55 FTE and \$16 million for contractor support and travel) to fully restore its team and resume the license application review and hearing, including rebuilding a portion of the program infrastructure. The NRC estimates it would cost approximately \$55 million per year to sustain the program.

Subcommittee. Once the team is back up and running, how much additional funding will the Department need to complete the Yucca license at the NRC?

If you can't give an exact answer, give us a ballpark range — is it \$10 million, or \$100 million, or more?



## WASTE CONFIDENCE

Subcommittee. Mr. Weber, after the Administration and the NRC terminated the Yucca Mountain licensing process, the courts found that the NRC could not establish a waste confidence rule based on an assumption that a spent fuel repository will exist when it is needed. It is extremely troubling that the Administration's termination of Yucca may have undermined the NRC's ability to find that spent fuel is safe. And so, I'd like to discuss how the NRC is moving forward to address this issue.

Given a scenario where the Administration and NRC have terminated Yucca Mountain licensing, does the NRC have what it needs to reach a waste confidence decision?

Mr. Weber. Yes. The NRC performed an orderly closeout of the Yucca Mountain licensing review because both future NWF appropriations and FTEs for this proceeding were uncertain; as a result, and consistent with the Commission's Memorandum and Order of September 9, 2011, the Yucca Mountain proceeding was suspended. Regarding Waste Confidence, the NRC has an adequate amount of information and resources to develop a new Waste Confidence rule. The NRC's Waste Confidence effort is not dependent upon Yucca Mountain or any other specific proposed geologic repository.

The NRC is preparing to issue the proposed Waste Confidence rule and draft generic environmental impact statement for public comment in the fall of 2013. For the sake of completeness, the NRC will consider several scenarios in the proposed rule and draft generic environmental impact statement, including one that considers the environmental consequences of indefinite storage, to address the environmental impacts that may occur if the United States does not construct and operate a repository.

Subcommittee. Does the Department of Energy's proposal—including interim storage and a repository that would open in the middle of this century, at the earliest—solve this problem? Or do we need a permanent repository on the books to have waste confidence?

Mr. Weber. The U.S. Nuclear Regulatory Commission's (NRC's) Waste Confidence rule and draft generic environmental impact statement

(GEIS) are not dependent upon any specific geologic repository or any specific plan for interim storage.

The NRC's draft GEIS and proposed rule will consider varying scenarios, including a longer-term storage timeframe and an indefinite-storage timeframe in order to address the environmental impacts that may occur if a repository is not available. Conclusions related to the environmental impacts of these scenarios will be included in the GEIS.

## YUCCA MOVING FORWARD, ON THE MERITS

Subcommittee. Regardless of whether the Administration restarts Yucca licensing or moves forward with a different strategy, it seems that Yucca Mountain should be considered as an option given the billions of dollars in taxpayer investment in the site. To date, has either of your agencies found anything lacking in the technical and safety merits of Yucca Mountain as a repository?

In GAO's prior work, many DOE and NRC officials, scientists, and industry representatives told us that completing the license review process and obtaining NRC findings on the technical merits of the license application would provide valuable information that could be applied to future efforts, even if Yucca Mountain was not pursued as a repository.

What would be the benefits and challenges if DOE and NRC were to resume their review of DOE's license application for Yucca Mountain and, whatever the results, what steps could be taken to preserve the information for future use?

Mr. Weber. The NRC benefited from the experience of conducting the licensing review, hearing, and closure process, because it was an unprecedented licensing review for the NRC. It allowed us to apply the regulations that were developed for the Yucca Mountain proposed repository site, as well as develop a better understanding of the type of technical demonstrations that are required pursuant to those regulations. The accrued benefits from the licensing review, hearing, and closure process to date would also inform any future license review for a geologic repository.

If the federal court directs the NRC to resume work on the Yucca Mountain License Application, the NRC's knowledge would continue to advance, to the extent that funds to conduct the work are currently available. The NRC would, however, face several challenges. Those challenges include reconstituting its review team with the appropriate personnel, given staff turnover and retirements, as well as reconstituting the necessary infrastructure of the administrative proceeding. For example, after capturing and preserving the data in Licensing Support Network (LSN), the NRC dismantled the LSN, which contained the Department of Energy's, NRC staff's and all other parties' relevant documentary material. This automated system is required by NRC regulation for the repository

proceeding and its absence would create a significant hardship for the parties when conducting discovery. Finally, the NRC no longer has the dedicated, electronic-capable hearing space that was established in Nevada especially for this proceeding. Although the NRC has a hearing facility in Maryland, it does not have sufficient space or the same electronic data management and audiovisual capabilities that were present in the Nevada-based facility created for this proceeding. Moreover, conducting the proceeding in Maryland may not allow the citizens of Nevada sufficient access to the proceeding, which was the reason the NRC established the Nevada facility. As a result, the NRC would likely need to acquire the use of a suitable hearing space, possibly in Nevada, should the proceedings resume.

In addition to the critical information in the LSN, the NRC has preserved much of the information that could be captured within the process of orderly closure. As part of its orderly closure in 2011, staff completed three Technical Evaluation Reports and more than 40 documents for knowledge capture of review experience.

## ALTERNATIVES AND DOE'S PROPOSED STRATEGY

### ADMINISTRATION'S PROPOSED FUNDING APPROACH

Subcommittee. Dr. Lyons, the Administration's proposal states that "a reformed funding approach that provides sufficient and timely resources" is needed to support waste disposal activities. Given how politicized the Administration has made this process, there is no way that we would allow funding to be removed from Congressional oversight.

Your proposal includes several elements that any funding arrangement must consider. Would you outline those elements for the Committee?

The Administration's budget request for fiscal year 2014 proposes that Congress appropriate a limited amount of funding each year for the management of nuclear waste storage and disposal programs. The request also proposes, however, that the bulk of funding for the design, construction, and licensing of storage and disposal sites is provided automatically each year from Nuclear Waste Fund fees—in other words, it circumvents appropriations by reclassifying it as mandatory spending. What perceived problem do you believe this funding arrangement addresses? If the Administration plans to move forward on a consent-based process, what do you believe the impediments to funding are, given that the primary issue with Yucca funding was opposition to the siting of the repository?

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#### TIMELINE TO 2048 AND FUNDING NEEDS

Subcommittee. Your proposal would restart the site selection process and potentially have a repository in operation by 2048 — about 30 years after Yucca Mountain should have been operational. That tells us that you must have at least a rough idea of what needs to be done to get there.

Would you describe for the Subcommittee what steps you see needing to take place between approval of your plans moving forward and 2048?

What is your projected funding needed to get to another operational repository?

What does the spending profile look like? I presume construction would take up the bulk of funding. How much, and starting when?

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## NUCLEAR WASTE FUND UNDER THE PROPOSED STRATEGY

Subcommittee. We asked staff to take a look at how the Nuclear Waste Fund would grow over the time period that you're proposing. They made a couple very conservative assumptions – that you collect \$783 million in new fees each year, as you estimate for 2013, and that your investments grow at 5% per year, as they have for the last several years. They also assumed that construction would take 10 years, therefore starting in 2037, and you wouldn't need any significant withdrawals from the Nuclear Waste Fund until construction started. They also assumed that you'd need approximately \$15 billion to study the new site and get it through the NRC licensing process.

The result was shocking. By 2037, the body of the Fund would be over \$100 billion dollars. And if no more fees were collected, the Fund would still contain over \$72 billion. It seems that the government needs to seriously rethink its collection of fees for the Fund.

Mr. Lyons, do you have an estimate for what your proposal would cost?

If not, why would the Administration continue to collect fees from ratepayers?

How can the Secretary continue to make a judgment that the fee must continue to be collected, given the large balance remaining in the Nuclear Waste Fund?

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## RISKS OF INTERIM STORAGE TO SITING AN ULTIMATE REPOSITORY

Subcommittee. Ultimately, our spent nuclear fuel needs to end up in a permanent geologic repository. Before then, the Administration's plan would start by moving the waste to interim storage. While this could have some benefits, it also risks taking pressure off of siting and developing a permanent repository.

Secretary Lyons, the Nuclear Waste Policy Act guards against this risk by only allowing interim storage once a repository has been sited. How would your proposal prevent an interim storage facility from becoming a de facto permanent storage facility?

Mr. Weber, what is the NRC's perspective on this issue? How long would an interim storage facility's license extend, and how long could it be extended if it became a de facto permanent storage facility?

Mr. Weber. The NRC has found that waste can be safely stored in interim storage facilities. Thus, the NRC has regulations and regulatory processes in place that could be used to review an interim spent fuel storage facility for away-from-reactor interim storage of spent nuclear fuel and, if appropriate, issue a license. Under these regulations, neither the initial license term nor a subsequent license renewal for an independent spent fuel storage facility installation may exceed 40 years. The NRC regulations do not limit the number of times a license may be renewed. However, renewal applications must demonstrate that the independent spent fuel storage installation will continue to be safe and secure and will perform its intended function for the requested period, typically through aging analyses and aging management programs.

Subcommittee. How could waste confidence be affected if a repository didn't materialize after waste is moved into interim storage?

Mr. Weber. As currently planned, the proposed Waste Confidence update will evaluate the possibility that a repository does not become available. Because the NRC's Waste Confidence draft generic environmental impact statement will consider an indefinite-storage timeframe to address the potential environmental effects of failing to site a



repository, failure to site a repository in the future would not undermine the proposed Waste Confidence effort.

If new information emerges in the future that affects the basis of the Waste Confidence rule, then the NRC will gauge the significance of the new information and will review and update the rule as necessary.

Subcommittee. We've asked about the risks of using interim storage, so perhaps I'll give you a chance to highlight some of the benefits. Why should we bother with interim storage, if it's another step in the process towards ultimate disposal in a repository?

Mr. Weber. The Department of Energy (DOE) is the lead agency for implementing any changes to the national policy on nuclear waste management. As the national policy evolves, the NRC's mission remains the same – to ensure the safe and secure use of radioactive materials while protecting people and the environment. The NRC's role is not to promote a specific national waste management policy.

## CONSENT-BASED SITING

Subcommittee. Dr. Lyons, your announced strategy states that you are “developing plans for initiating a consent-based siting process.”

What plans are you making?

Do you have the authority to initiate such a process without legislative action? Where is the line between authorized and unauthorized activities?

The Department’s proposal for consent-based siting is quite vague. In this case, the details matter quite a lot. Who is defining “consent”?

Repositories hold great potential to improve the economy of a region. Do you think that this will be enough to help build consensus around a site, or will the Administration propose additional incentives?

How do you think this approach can overcome the “not in my back yard” syndrome, where even if a local government would be amenable to a repository, other major metropolitan or state interests may oppose such a siting?

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## PROPOSAL FOR A NEW WASTE MANAGEMENT ORGANIZATION

Subcommittee. Dr. Lyons, your proposal includes a new waste management and disposal organization, or MDO. Why do you believe that a new organization is necessary? Why is the Department of Energy unable, or potentially unwilling, to do this job?

Your proposal is short on detail, yet setting up an entirely new organization is a very complicated undertaking. What would the responsibilities for this organization be?

Would this new organization be responsible for submitting and defending a new license application to the NRC?

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Subcommittee. Mr. Weber, how would the NRC's licensing activities be affected by the form that a waste management organization takes?

Mr. Weber. The NRC's licensing activities would not likely be affected by the form that a waste management organization takes. Possession of commercial spent nuclear fuel and high level waste for storage, transportation, and disposal is expected to continue to be regulated by the NRC. The new waste management organization would likely be a new NRC applicant. The NRC has experience in licensing facilities that are owned by a range of public and private entities. Like any new applicant, this organization would need to demonstrate readiness to become a nuclear license holder. This would include establishing an institutional framework that maintains safety and security throughout the lifetime of the proposed facility. We anticipate that regulatory interactions with the new organization would be consistent with our experiences with other applicants.

## REPROCESSING AND ALTERNATIVE FUEL CYCLES

Subcommittee. Some other nations, such as France, are considering “closed” or “modified” fuel cycles that use reprocessing or other means to extract more energy. This is relevant to our discussion today because these fuel cycles have the potential to considerably reduce both the amount of high-level waste and the number of years that waste remains dangerous.

What are the risks, both here and abroad, of these other fuel cycles?

Per unit of energy generated, by how much could a closed fuel cycle reduce our quantity of nuclear waste produced?

Are there other considerations that would impact storage of the remaining waste if a modified or closed cycle is to be a future option?

A few years ago in our fiscal year 2010 budget hearing, we heard Secretary Chu say that recycling fuel is an area that should be considered which could warrant interim storage before we dispose of spent fuel in a repository. And yet, the Department’s strategy released this January proposes to permanently dispose of nearly all our nation’s current stock of the spent fuel. If Secretary Chu highlighted fuel recycling as one of the few reasons for stopping Yucca and looking at the big picture again, why are you not proposing to recycle any appreciable amount of the nation’s current spent fuel?

One of the premises of the approach to Yucca was that the waste should be retrievable. How would a modified or closed cycle impact this policy decision?

Given the state of the uranium market, is the ability to retrieve waste at a later date necessary any longer as a technical consideration?

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**SUBCOMMITTEE QUESTIONS: PANEL 2****CONSENT-BASED SITING****CONSENT-BASED SITING PROPOSALS BY THE BRC AND DOE**

Subcommittee. Ms. Eisenhower, the Blue Ribbon Commission's recommendations released more than a year ago proposed the use of a "consent-based" process when selecting both interim storage and repository sites.

What exactly did the BRC mean when it said consent-based, and how is that different than past processes used in the United States?

We understand any site would have proponents and opponents. What, in your estimation, constitutes consent? Does every level of government need to support the project? And in the spectrum between one opposing citizen across the state from the site and a full half of the hosting county opposing, what amount of opposition do you believe would constitute a lack of consent?

Do you believe there are sites in the United States supported by every level of government and with little local and statewide opposition?

Ms. Eisenhower. The BRC believed that a consent-based approach to developing nuclear waste disposal and storage facilities is the best way to ensure that spent fuel and high level waste does not remain stored in communities around the country indefinitely without their consent. We made this recommendation because experience in the United States and in other nations suggests that any attempt to force a top-down, federally mandated solution over the objections of a state or community—far from being more efficient—will take longer, cost more, and have lower odds of ultimate success.

Numerous comments to the BRC raised the question of how to define "consent." Some stakeholders, for example, suggested that consent within a state could be measured by a state-wide referendum or ballot question. On the other hand, the WIPP facility was sited, opened, and has been operated without the state's elected leaders employing such consent-measuring mechanisms. The Commission took the view that the question of how to

determine consent ultimately has to be answered by a potential host jurisdiction, using whatever means and timing it sees fit. We concluded that a good gauge of consent would be the willingness of the host state (and other affected units of government, as appropriate) to enter into legally binding agreements with the facility operator, where these agreements enable states, tribes, or communities to have confidence that they can protect the interests of their citizens.

The BRC cannot guarantee that the consent-based process will site either a storage or disposal facility without possible delay. However, other consent-based programs that are now under way in Canada and France, and that recently succeeded in Spain, stressed that several elements were critical in establishing a foundation for public trust and the support necessary for the timely siting of nuclear facilities, including:

- A clear and understandable legal framework
- An opt-out option for the local affected community, up to a certain point in the process
- The availability of financing for local governments and citizen organizations for conducting their own analyses of the site and siting issues
- Compensation for allowing the investigation and characterization of the proposed site
- A concerted effort to promote knowledge and awareness of the nuclear waste issue and plans for addressing it through mechanisms such as:
  - Seminars, study visits, and reviews conducted by the local government
  - Information to and consultation with local inhabitants
  - Socioeconomic studies and evaluations of impacts on local businesses
- Openness and transparency among and within the implementing organization, the national government, local governments, and the public.

Because the BRC was not a siting commission, it did not investigate specific sites for the location of facilities. However, as I pointed out in my testimony, the Commission heard testimony indicating that potential host communities, states and tribes would be willing to participate in an open process that

engages affected constituencies from the outset and gives them actual bargaining power. Nevertheless, the potential difficulty of siting consolidated storage and the need for a thoughtful approach to this task must not be underestimated. That is the reason that our first recommendation is for a new, consent-based approach to siting future nuclear waste management facilities. While there is no certainty about how long such a process might take, the only way to find out is to try it.

Subcommittee. Your testimony cites recent experiences in Spain, Finland, and Sweden as encouraging examples of consent-based siting. Can you elaborate on those experiences? How are their consent-based approaches working, and what challenges are they having?

Dr. Ewing, what do you glean from the experiences of these three countries — Spain, Finland, and Sweden? Are they encouraging examples of consent-based siting — and importantly, are their forms of government similar enough to ours that we can hope for similar results here?

Mr. Rusco, both the Blue Ribbon Commission and the Department of Energy propose moving forward with a form of consent-based siting. But, of course, “consent-based” could mean many things, and

How would you characterize the Department of Energy’s proposal for consent-based siting? Does it make any improvement over the process used thus far?

Mr. Rusco. We have not evaluated the Department of Energy’s (DOE) proposal for consent-based siting and it may be difficult to do so until the specifics of the proposal are better defined. Both the Blue Ribbon Commission, in its January 2012 report, and DOE, in its January 2013 Strategy for the Management and Disposal of Used Nuclear Fuel and Other High-level Radioactive Waste recommended using a new consent-based approach for siting future nuclear waste management facilities. According to DOE’s January 2013 strategy, the department is developing plans for its consent-based processes, including defining consent, deciding how that consent is codified, and determining whether or how it is ratified by Congress.

Subcommittee. What are some of the options or variables when defining a consent-based process? What is the range of possibilities we're talking about here and some of the dimensions for us to think about?

Mr. Rusco. As we reported in April 2011,<sup>1</sup> because no nation has built a permanent repository for spent nuclear fuel or high-level radioactive waste, there is no model or set of lessons that will guarantee success in this complex, decades-long endeavor. We reported that transparency, incentives, and education were important features that could improve the likelihood of success. However, some social and political opposition may be extremely difficult to overcome, regardless of any of these features.

We reported in June 2011 that overcoming social and political opposition and gaining public acceptance is crucial, and the federal government has several tools for doing so.<sup>2</sup> One important tool is cooperation with key stakeholders, as we reported and the Blue Ribbon Commission stated in its January 2012 report. Specifically, we cited the need for the federal government to involve stakeholders but also to be transparent and cooperative. Similarly, the Blue Ribbon Commission stated that all affected levels of government must have, at a minimum, a meaningful consultative role in important decisions. As state government officials told us, if local communities or states feel that the federal government is not willing to address their concerns in a transparent way, they will be less inclined to work cooperatively with the federal government. Another important factor is allowing states to have an oversight role. One reason for the success of the Waste Isolation Pilot Plant (WIPP)—a permanent repository for transuranic waste in New Mexico—was that DOE conceded some of its authority to the state and worked collaboratively with state officials,<sup>3</sup> albeit in response to lawsuits. States are important partly because they have broader constituencies than local communities and some of these constituencies may be more likely to raise objections. Other considerations for overcoming social and political opposition include long-term incentives and education.

<sup>1</sup>GAO, *Commercial Nuclear Waste: Effects of a Termination of the Yucca Mountain Repository Program and Lessons Learned*, GAO-11-229 (Washington, D.C.: Apr. 8, 2011).

<sup>2</sup>GAO, *Nuclear Waste: Disposal Challenges and Lessons Learned from Yucca Mountain*, GAO-11-731T (Washington, D.C.: June 1, 2011).

<sup>3</sup>The Waste Isolation Pilot Plant was designed to accept transuranic waste, not spent nuclear fuel. Generally, transuranic waste consists of clothing, tools, rags, residues, debris, soil, and other items contaminated with radioactive elements heavier than uranium, mostly plutonium, as a result of work related to the defense industry.



Substantial, long-term federal investments in the host community and state can help win support by keeping key parties committed to a repository over the several decades of development. Education has also helped foster public acceptance. For example, DOE's contractor at WIPP gained public acceptance through education and training programs on the safe transportation of radioactive waste. One important aspect of education has been efforts to dispel the inaccurate perception that nuclear waste poses risks comparable to nuclear weapons.

Subcommittee. Have we used a consent-based process before?

Mr. Rusco. We described several efforts prior to the Yucca Mountain program to develop a radioactive waste repository in April 2011,<sup>4</sup> and none of these efforts were consent-based, as described by the Blue Ribbon Commission, including efforts to develop WIPP. However, we also reported in April 2011 that local community support was a key element in the success of opening WIPP. WIPP is currently the world's only operating permanent geologic repository for nuclear waste, although it only accepts defense-related transuranic waste. DOE and state and local government officials said that transparency was an important factor in the successful opening of WIPP. For example, DOE evaluated key technical issues in the design of WIPP in part by using panels of independent experts, whose internal discussions and results were open to the public. Furthermore, according to a DOE report, stakeholders and the public were invited to actively participate in many WIPP technical meetings, and the public was allowed access to technical documents on characterizing the WIPP site.

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<sup>4</sup>GAO-11-229.

## MODERN APPROACHES FOR SITING NUCLEAR WASTE DISPOSAL

Subcommittee. Dr. Ewing, your Board released a report in 2011 reviewing the international experience with nuclear waste management. First, I thought this was a very helpful piece of research, but I did want to hear your thoughts on a few issues.

Among other things, the report attempts to assess the way waste management has changed over the years, and highlights a modern trend towards “adaptive management” or “staged decision-making”. This approach essentially means that governments should take public and local opinion into account at every step along the way and adapt or halt the plan accordingly. In other words, it’s part and parcel of a consent-based siting process, and communities would have a larger role to play.

But the Board’s report also points out that a staged decision-making process is not a cure-all and may not work in many circumstances. If every community can stop the process at every step, many of these engagements may fail.

Dr. Ewing, where have we seen a staged decision-making process along with public involvement used, and has it been successful?

Dr. Ewing. Any process for developing a repository likely will have to be staged—almost out of necessity. However, the notion of adaptive management or staged decision-making has emerged over the last 15 years or so. It differs from past approaches in two respects. First, decisions are evaluated at predetermined points, typically more often than has been the case in the past. Second, movement from one stage to another usually requires the involvement of interested and affected parties in addition to the program implementer and regulator. For a consent-based process, the technical judgment of site-suitability should be blended with an explicit process of community, state, and possibly tribal involvement.

As can be seen from the following examples, more elaborate staged programs can be effective, but they also may encounter obstacles.

France

As I mentioned in my testimony, the French program is probably the best example of a mature adaptive repository development process. A law passed in France in 1991 called for volunteers to host an underground research laboratory. Communities located near the town of Bure in Meuse/Haute Marne agreed to host such a facility, understanding that if the geology appeared to be suitable the French government could develop a repository in the area without seeking further local approval.

After several years of site investigation, a public debate was held about whether to proceed to the next stage, and in 2006, the French Parliament selected the area near Bure as the site for a repository. However, one outcome that resulted from the public debate was that the Parliament added “reversibility” as a condition for licensing a repository.

A second public debate is scheduled for later in 2013 on whether to go to the next stage, which is approval of a license application. According to the plan laid out in the 2006 law, the French implementer, ANDRA, will prepare an application in 2015. Parliament will decide whether to approve the application after taking into account the results of the second public debate as well as advice from ASN, the French regulator, and the French technical overseer, the Committee for National Evaluation.

#### Canada

The Canadians are at a very early stage in their adaptive management process. So far, 21 communities have expressed interest in the possibility of hosting a repository. Detailed geologic investigations are now being carried out in many of the communities. Although the Canadian approach appears quite promising, it will be years before the success of the effort can be known.

#### United Kingdom

The United Kingdom also created a stepwise process, known as Managing Radioactive Waste Safely (MRWS). Several communities in one area, Cumbria County, where nuclear facilities at Sellafield are located, responded to requests from Government to volunteer to participate in the process. In January, 2013, the two local borough councils, Copeland and Allerdale, agreed to go to the next stage, detailed site investigations, but the Cumbria County Council did not. So the MRWS process was halted. In May 2013,

Government launched a consultation process to determine whether the MRWS process needed to be modified for the future. (See the response to Question 3 for a more detailed discussion of the situation in the United Kingdom.)

#### Sweden

Sweden used a process that is structurally very similar to the one in place in the United States (see answer to next question). However, under Swedish law, the local municipality has for all practical purposes a near-absolute veto over the granting of a repository construction license. Thus the Swedish implementer, SKB, made an extraordinary effort to engage local communities as it was conducting site investigations and preparing its license application.

Subcommittee. How has the process used to date here in the United States been similar or different to this a staged decision-making process? How do you think such a process would work in the United States, and what might be the risks and pitfalls?

Dr. Ewing. The Yucca Mountain Project is the only U.S. effort to attempt to develop a deep-mined geologic repository for high-level radioactive waste and spent nuclear fuel. It incorporates some, but not all, of the elements of a staged decision-making process. Under the U.S. approach, established by law and regulation, Congress must approve the President's selection of a site for a deep-mined geologic repository; the Department of Energy must first apply for a license to construct the facility and then must obtain a license from the Nuclear Regulatory Commission to receive and possess the waste. Finally, the Department of Energy must be given permission by the Nuclear Regulatory Commission to close the repository.

There is no reason why the United States could not adopt a consent-based staged process similar to the approaches being implemented in France, Canada, and the United Kingdom. However, doing so would require that (1) the implementer is open and sensitive to the need for engaging in a meaningful way with interested and affected parties, (2) serious thought is given to how information gathered during site investigation can be integrated into the repository development and review processes, and (3) conditions are established at the outset under which the implementer, a community, and/or a state could withdraw from the process.

The primary risk of implementing such an explicit process in the U.S. or elsewhere is that a repository siting or development program may be terminated after it is well underway. However, we know from the Yucca Mountain experience and the experiences of several other countries that other types of approaches are no guarantee of success.

Subcommittee. Ms. Eisenhower, do you have any thoughts on the issue? How do you believe adaptive management should play a role, and how does it relate to the siting process and strategy implementation?

## CONSENT-BASED SITING CHALLENGES, AND THE UK EXAMPLE

Subcommittee. The United Kingdom is currently using a consent-based process that follows “staged decision-making” practices — that is, as they proceed through stages of siting and development, local communities and governments must vote to proceed. Earlier this year, we saw the local county of Cumbria reject plans to continue with the process of looking for a waste repository site. That vote represents the withdrawal of the last remaining candidate host for a repository in the U.K.

Dr. Ewing, the U.K. example is one illustration of the difficulties of a consent-based or “adaptive management” process. What can we learn from the U.K. experience? Is what they’re calling “consent-based” helping the process?

Dr. Ewing. There appear to be several reasons that the Managing Radioactive Waste Safely (MRWS) process did not advance that are particular to the situation in the United Kingdom. First, specific locations where a repository could be built in the Cumbria area were never identified. Second, although assurances were given by Government late in the process that affected communities could withdraw at one or more defined points, some of the parties were not convinced that they would be allowed to do so in practice. Third, the benefits that communities might receive at each stage of the process were not made clear. Fourth, the respective authority to move forward that could be exercised by the Copeland and Allerdale borough councils, on the one hand, and the Cumbria County council, on the other, was not clarified until late in the process. In particular, only after the process had nearly reached its conclusion did Government decide that it would be necessary for the Cumbria County Council to agree. This opened the door, in the view of some in the United Kingdom, for opponents to focus their efforts on a single governing body. It also meant that a broader set of interests beyond those of Copeland and Allerdale had to be addressed.

Subcommittee. What is lacking in the U.K. example? Do they — and will we, if we move forward in this fashion — need incentives?

Dr. Ewing. In addition to the need to make clear in the beginning what a benefits package might be—some more general lessons can be taken from the experience of the United Kingdom:

- First, the managing organization must be an active participant in the process. The Nuclear Decommissioning Authority (NDA), the presumptive implementer of the repository program in the United Kingdom, was only an observer in the process; thus, opportunities to develop trust between the NDA and the localities were limited. This contrasts greatly with the situations in Sweden, France, and Canada.
- Second, a well-developed safety case for disposing of high-level radioactive waste and spent nuclear fuel needs to be established before engaging the community. Although the safety case approach has not been used in the US, it is common in European countries. A safety case is a synthesis of evidence, analyses, and arguments that quantify and substantiate the basis for a determination that a repository will be safe after it is closed. A key function of the safety case is to provide a platform for informed discussions at specific points in the process of repository development, whereby interested parties can express their level of confidence in a project and identify where further work is needed. A well-developed safety case also would make clear what sites might be suitable and what sites might be unacceptable (in this regard, the situation in the United Kingdom contrasts with that in France and Sweden). The safety case should be independently peer-reviewed, perhaps by the U.S. Nuclear Waste Technical Review Board and by an international body such as the Nuclear Energy Agency or the International Atomic Energy Agency.
- Third, a well-defined allocation of authority among the various levels of government needs to be established early in the process, preferably in law. In addition, the conditions and timing under which the right of withdrawal might be exercised also must be made clear. The experience in the United Kingdom suggests that the issue of allocation of power and authority is not limited to federal systems of governance.

Subcommittee. How does the U.K.'s version of "consent-based" differ from that of other nations, such as Sweden?

Dr. Ewing. As noted in my response above, the process used in Sweden was very different from the one used in the United Kingdom. Sweden's consent-based strategy was similar to the approach in the United States, but it recognized and accommodated the municipalities' near-absolute right to veto the granting of a construction license. The United Kingdom used an explicit partnership approach similar to one used in Belgium to site a low- and intermediate-level waste disposal facility. The approach has now been adopted by Canada. Under the partnership approach, communities are intimately involved in an adaptive stepwise process. In such a partnership, roles, responsibilities, and authorities need to be made clear in advance.

Subcommittee. If we use incentives to get host volunteers, perhaps disadvantaged communities may be more likely to volunteer. Is there an equity issue here that would lead to an undesirable solution?

Dr. Ewing. Any consent-based program should have a strong technical basis that includes an open and comprehensive technical and scientific evaluation of the site and the facility design. Independent technical review and local oversight of siting and development activities at any site is critical, as is full disclosure leading to an understanding of the consequences of participating in the program. With this information in hand, communities will be able to make an informed choice about whether to participate in a consent-based, staged repository development process. Economically strong communities around nuclear facilities in Sweden and Finland have agreed to host repositories for spent nuclear fuel.



## REPOSITORIES

### INTERNATIONAL CONSENSUS ON GEOLOGICAL REPOSITORIES

Subcommittee. Dr. Ewing, the Nuclear Waste Technical Review Board's 2011 report on experience gain in the United States and overseas states that while a number of waste management options have been considered, almost all nations have determined that deep-mined geologic repositories are the preferred option.

Is a strategy based on consolidated above-ground interim storage going against that international consensus?

Dr. Ewing. The development of a consolidated interim storage facility does not go against the international consensus on the preference for deep-mined geologic repositories. Sweden already has developed a centralized storage facility—CLAB—which has been operational for decades. Other countries, such as France, have operational reprocessing facilities where vitrified high-level radioactive waste is stored. Both the United Kingdom and Canada envision storage facilities as part of their long-term waste management plans. In short, consolidated storage facilities can be part of an integrated waste-management approach that necessarily will include a deep-mined geologic repository.

Subcommittee. Is there international consensus on the ability to later retrieve the waste?

Dr. Ewing. There is no international consensus on whether or for how long waste should be retrievable nor is there any consensus on whether a long-term waste management approach should incorporate the more ambitious "reversibility" requirement. Retrievability is not required by regulation in Sweden or Finland, for example, and neither country is designing its repository to facilitate it. As discussed in the answer to question one, in France, "reversibility," was added as a condition after public debate on continuing to the next phase of repository licensing. The United Kingdom has not taken a position so far on the need for retrievability or reversibility.

Subcommittee. The Department of Energy began investigating drilled borehole disposal. Given the apparent international consensus on deep-mined repositories, is this borehole investigation time and effort wasted?

Dr. Ewing. Significant challenges involving drilling and sealing boreholes and the need to extensively repackage spent nuclear fuel are associated with implementing a program of deep borehole disposal. For this reason, the Board has recommended that research related to deep borehole disposal should not delay higher priority research on a mined geologic repository. The Board will issue an updated "fact sheet" on this subject in the near future.

## BENEFITS AND CHALLENGES OF YUCCA MOUNTAIN REPOSITORY

Subcommittee. Mr. Rusco, the development of Yucca Mountain certainly had challenges—as any repository would. But it also was well-suited for the job in many ways.

What technical or other benefits have the GAO or other organizations found that Yucca Mountain would have as a repository?

Mr. Rusco. A geologic repository at Yucca Mountain could have offered the nation a variety of benefits, as we reported most recently in April 2013.<sup>5</sup> If the repository had been built as planned, it would have provided a permanent solution for the nation's nuclear waste, including commercial nuclear fuel, and would have minimized the uncertainty of future waste safety. We reported in November 2009 that the nuclear power industry sees a permanent solution as an important consideration in obtaining the public support necessary to build new nuclear power reactors.<sup>6</sup> We also reported in August 2012 that the Yucca Mountain program was already pretty far along and, if licensed and constructed, could begin accepting spent nuclear fuel within about two decades.<sup>7</sup> This could allow DOE to begin addressing industry's lawsuits against it because it did not take custody of the spent fuel in 1998 as required by the Nuclear Waste Policy Act of 1982, as amended.

Subcommittee. Were there any challenges or technical difficulties identified for Yucca Mountain as it went through the process?

Mr. Rusco. As we reported in April 2011,<sup>8</sup> when DOE began taking steps in 2010 to terminate the Yucca Mountain repository program, DOE told us that the primary challenge facing the project was lack of public acceptance from the people of Nevada, rather than technical difficulties with the project itself. In its June 29, 2010, ruling on DOE's motion to withdraw its license application for Yucca Mountain, the Nuclear Regulatory

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<sup>5</sup>GAO, *Commercial Spent Nuclear Fuel: Observations on the Key Attributes and Challenges of Storage and Disposal Options*, GAO-13-532T (Washington, D.C.: Apr. 11, 2013).

<sup>6</sup>GAO, *Nuclear Waste Management: Key Attributes, Challenges, and Costs for the Yucca Mountain Repository and Two Potential Alternatives*, GAO-10-48 (Washington, D.C.: Nov. 4, 2009).

<sup>7</sup>GAO, *Spent Nuclear Fuel: Accumulating Quantities at Commercial Reactors Present Storage and Other Challenges*, GAO-12-797 (Washington, D.C.: Aug. 15, 2012).

<sup>8</sup>GAO-11-229.

Commission's (NRC) Atomic Safety and Licensing Board stated that the Nuclear Waste Policy Act of 1982, as amended (NWPA) provided the Secretary of Energy with an opportunity to report any reasons that the Yucca Mountain site was not suitable prior to submitting its license application, but DOE reported no such issues. Moreover, NRC officials told us that no new technical or safety issues related to the Yucca Mountain repository had been reported to them since DOE had submitted its license application in 2008.

Because DOE and NRC separately suspended their efforts to license Yucca Mountain repository in 2010, it is uncertain whether any technical difficulties would have been identified as the process progressed. Many DOE and NRC officials, scientists, and industry representatives we spoke with told us that completing the license review process and obtaining NRC findings on the technical merits of the license application would have provided valuable information that could be applied to future efforts, even if Yucca Mountain was not pursued as a repository.

Subcommittee. Were these unique to Yucca Mountain, or would any repository site have issues like these?

Mr. Rusco. As we reported in April 2011, earlier efforts to develop high-level waste repositories in Kansas and New Mexico—similar to efforts at Yucca Mountain—were not successful because of local community and state opposition.

## **INTERIM STORAGE AND OTHER APPROACHES**

### **TRANSPORTATION ISSUES WITH CONSOLIDATED INTERIM STORAGE**

Subcommittee. The Blue Ribbon Commission and the Department of Energy's proposals to use consolidated interim storage facilities do create some potential challenges. For example, with Yucca Mountain, we would ship all spent fuel once from reactor sites to the repository, but interim storage would create another stop along the way towards ultimate disposition.

How could interim storage create undesirable impacts relating to the transportation of waste? What are the variables at play here, and the potential impacts to both cost and safety?

Mr. Rusco. Transporting large amounts of spent fuel is inherently complex and may take decades to accomplish, depending on a number of variables including distance, quantity of material, mode of transport, rate of shipment, level of security, and coordination with state and local authorities. According to the Blue Ribbon Commission report, planning and providing for adequate transportation capacity will take time and present logistical and technical challenges.

Dr. Ewing. While experience in this country and internationally has shown that transportation of spent nuclear fuel and high-level radioactive waste is quite safe, moving waste first to a consolidated storage site would increase the scale of the transportation effort. Moreover, as the length of time of interim storage increases either at utility sites or at a consolidated storage facility, so does the likelihood that spent nuclear fuel already in dry storage would have to be repackaged to meet transportation requirements. Repackaging of stored waste could increase worker exposures to the waste and would affect costs; however, calculating the costs of activities is not part of the Board's technical purview.

Subcommittee. The Department of Energy's Office of Civilian Radioactive Waste Management estimated in 2008 that the cost of transporting spent fuel to a repository would be more than \$19 billion. Could using interim storage double that cost? In other words, could the use of

interim storage cost taxpayers in the range of \$19 billion because we're moving fuel around twice?

Mr. Rusco. It is difficult to estimate costs without knowing where either the interim storage or final disposal sites will be. As noted above, it will be a complex and time consuming process. However, it is reasonable to assume that building and using an interim site in addition to a permanent site will cost significantly more than simply building a permanent site.

Dr. Ewing. This issue is outside the Board's technical and scientific purview.

Subcommittee. Some have proposed that preference should be given to candidate sites for interim storage that could also host a permanent repository, as a way to minimize the risk that spent fuel would have to be transported twice. They, in fact, seem to have high hopes of finding one site to do it all. Are there risks of scaring off host sites by implying we're looking for an interim facility to ultimately sign up for a repository as well?

Mr. Rusco. We have not evaluated this issue.

Dr. Ewing. Co-location of the two facilities could minimize the scale of the transportation effort and possibly avoid the need to repackage spent nuclear fuel after extended storage. However, it is important to note that the technical requirements for a site that would be the location of a storage facility may be very different from those for a permanent deep-mined geologic repository. Other issues related to co-location of a storage facility and a repository relate to policy questions that are outside the Board's technical and scientific purview.

## RISK OF INTERIM STORAGE REDUCING LIKELIHOOD OF A REPOSITORY

Subcommittee. The United States' current law governing nuclear waste policy only authorizes interim storage once a repository is sited. The Administration's proposed strategy released in January has no such requirements, and opens us up to the risk that a facility opened up for interim storage inadvertently becomes a permanent above-ground storage facility.

How does the Department's strategy open us up to this risk, and what can be done to prevent it?

Mr. Rusco. We have not evaluated this issue.

Dr. Ewing. Regardless of the process adopted to identify a location for a consolidated storage facility, the possibility that it might become a repository will really only be eliminated when a deep-minded geologic repository begins operation. To the extent that policy-makers are concerned about this risk, they can establish links between the development of an interim storage facility and a repository.

Subcommittee. What are the other issues — safety, cost, or other — if an interim storage site become a much longer-term facility if a repository fails to materialize?

Mr. Rusco. NRC has reported that spent fuel is safe and secure in dry storage systems. However, in November 2009, we reported that a consolidated interim storage facility for spent nuclear fuel would have to rely on active institutional controls, such as monitoring, maintenance, and security, which would have to be maintained over time. In August 2012, we reported that two consolidated interim storage facilities would cost about \$16 billion to \$30 billion over 100 years.<sup>9</sup> We also reported that experts considered spent fuel dry storage systems safe for about 100 years, after which some spent fuel might have to be repackaged because of degradation of the storage systems. Repackaging spent fuel could cost from \$180 million to nearly \$500 million, with costs depending on several variables, including the amount of spent fuel to be repackaged.

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<sup>9</sup>In constant 2012 dollars.

Dr. Ewing. Extended storage of spent nuclear fuel may present technical challenges. For example, over long time periods, degradation of spent nuclear fuel or the containers in which the spent nuclear fuel is stored may occur. Degradation mechanisms that occur over periods of more than 100 years are not well understood, especially for “high burnup” spent nuclear fuel.



## NEW PROPOSED WASTE MANAGEMENT ORGANIZATION

Subcommittee. Both the Blue Ribbon Commission and the Department of Energy's strategy propose a new organization to select and develop interim storage and repositories.

Ms. Eisenhower, what problems currently in the system did the BRC seek to address by recommending the creation of an organization other than the Department of Energy? And do you think an independent or quasi-independent organization would do the trick?

Your testimony and the Blue Ribbon Commission recommended a federal corporation over other options. Why do you believe that will be more successful than other organization types, and what are the downsides of a fedcorp?

Ms. Eisenhower. For the last 60 years, the DOE and its predecessor agencies have had primary responsibility, subject to annual appropriations and policy direction by Congress, for implementing U.S. nuclear waste policy. DOE is a large cabinet-level agency with multiple competing missions, a budget that is dependent on annual congressional appropriations, and top management that changes with every change of administration, and sometimes more frequently than that.

Clearly, multiple factors have worked against the timely implementation of the NWPA and responsibility for the difficulties of the past does not belong to DOE alone. Nevertheless, the record of the last several decades indicates that the current approach is not well suited to conducting a steady and focused long-term effort, and to building and sustaining the degree of trust and stability necessary to establish one or more disposal facilities and implement other essential elements of an integrated waste management strategy. These considerations led the Commission to agree with a conclusion that has also been reached by many stakeholders and long-time participants in the nation's nuclear waste management program: that moving responsibility to a single purpose organization—outside DOE—at this point offers the best chance for future success. For example, a new organization dedicated to the safe, secure management and ultimate disposal of high-level nuclear waste can concentrate on this objective in a way that is difficult for a larger agency that must balance multiple agendas or policy priorities. A new organization will be in a better position to develop a strong culture of safety,

transparency, consultation, and collaboration. And by signaling a clear break with the often troubled history of the U.S. waste management program it can begin repairing the legacy of distrust left by decades of missed deadlines and failed commitments. Finally, while the Commission recognized that it will never be possible or even desirable to fully separate future waste management decisions from politics, we believed a new organization with greater control over its finances could operate with less influence from short-term political pressures. We did not propose that a new organization be less accountable for its actions—on the contrary, effective oversight by Congress and by a strong, independent regulator remains essential. But with greater control over year-to-year budgets and operations, we believed a new organization could more easily maintain the program-level continuity and mission consistency that has often been lacking at DOE.

The BRC believed that a federal corporation chartered by Congress offers the most promising model for the management of the nation's nuclear waste program. However, the Commission noted that other organizational structures are possible and that the manner in which the organization behaves and delivers on commitments is more important than what specific organizational form it takes. Striking the right balance of independence and accountability is the key challenge, whether a new waste management organization is structured as a federal corporation or takes some other form. In any case, Congress must provide clear policy direction, exercise ongoing oversight, and establish the necessary funding mechanisms but should leave control of operational decisions and resource commitments for implementing the policy direction to the new organization – regardless of its structure. Those decisions and commitments, and indeed the performance of the organization as a whole, would, of course, be subject to policy, safety, security, technical, and financial review by appropriate government agencies and Congress.

Subcommittee. Mr. Rusco, and Dr. Ewing if you have any perspectives, what existing or past problems could a new organization help to solve, and what challenges is a new organization unlikely to solve?

Mr. Rusco. As we reported in April 2011,<sup>10</sup> some reports and stakeholders from state and community groups stated that a nuclear waste management program should be insulated from the political influences and

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<sup>10</sup>GAO-11-229.

changes in policy that have plagued the process for decades. The 1985 independent report on alternative methods for financing and managing the nuclear waste program recommended that a federally chartered government-owned corporation should be responsible for the siting and construction of the repository in an environment largely free from political influence. A 1982 report from the Office of Technology Assessment concluded that an independent agency may be the best, if not the only, way to maintain credibility. Some stakeholders agreed with these assessments, noting that DOE was subject to political influences and had lost a lot of its credibility as a result of changes in policy. They stated that an independent organization could bring the credibility necessary to draw key affected parties to an open and transparent discussion on siting.

Dr. Ewing. Based on international experience, organizations whose sole purpose is the long-term management of radioactive waste are more effective than multipurpose organizations. The particular form of the single-purpose organization seems less important. For example, in Sweden, Canada, and Finland, the organization is a corporation owned by the nuclear utilities. In France and the United Kingdom, it is a government organization. In this country, although the program to develop a repository at Yucca Mountain is in limbo, the Department of Energy has successfully constructed, obtained regulatory certification for, and operated a deep-mined geologic repository for transuranic waste at the Waste Isolation Pilot Plant in New Mexico.

Some of the most important factors in determining the success of a waste management organization may be the following:

- An ability to engender the trust and confidence of a variety of interested and affected parties.
- Continuity of leadership.
- Strong technical and scientific management that supports international collaboration, development and retention of technical and scientific expertise, and technical insights gained over time from ongoing research and development.
- Access to resources.

- Well-constructed accountability measures.

Subcommittee. What additional challenges does a new organization create compared to just having the Department of Energy continue to oversee nuclear waste disposal?

Mr. Rusco. A new organization is not guaranteed to be an improvement. Some quasi-governmental organizations have been developed and implemented with varying degrees of success. We have reported on quasi-governmental organizations and issues related to risky behaviors because of their federal sponsorship and the need for adequate oversight. Still other stakeholders we spoke with had different viewpoints, stating that DOE remains an adequate entity for the process, noting that it had successfully sited and built WIPP.

Dr. Ewing. Activities currently undertaken by the Department of Energy under the auspices of the Office of Environmental Management and the Office of Nuclear Energy such as developing the high-level radioactive waste form and packaging and transporting spent nuclear fuel and high-level radioactive waste need to be fully integrated. If any of these activities are managed by different organizations, additional details on the roles and responsibilities and the interactions between the organizations will be necessary to ensure that the necessary integration occurs.

## FUNDING MECHANISMS

Subcommittee. The Blue Ribbon Commission proposed that funding for waste management projects be changed to circumvent appropriations.

Ms. Eisenhower, is this an accurate summary of the recommendation?

Your testimony expresses disappointment that the Department of Energy has not proposed to use non-legislative means to reclassify Nuclear Waste Fund receipts as discretionary — meaning the receipts would show up on this subcommittee's books each year. Why do you think that's preferable to the Department's proposal?

This Subcommittee has provided funding to Yucca Mountain throughout the last decade, up until the Administration terminated the process. What exactly would this new funding mechanism be fixing, when — in our estimation — funding was not the source of the problem?

Ms. Eisenhower. The legislative history of the Nuclear Waste Policy Act makes it clear that the intent of Congress in establishing a self-financing mechanism based on contractually-obligated user fees was to “provide an assured source of funds to carry out the programs and...eliminate...annual budgetary perturbations in an ever more constrained Federal budget,” while at the same time ensuring that “the Federal budget will not be burdened by repository program expenditures.” Congressional oversight through the annual appropriations process would ensure that expenditures from the Fund would be made prudently and for their intended purposes. But the Fund was clearly designed to ensure that the waste program's needs and schedules determined its funding, rather than allowing federal budget constraints to limit the program's progress. As the BRC noted, the Nuclear Waste Policy Act's provisions for an expanded and accelerated repository program and its direction to DOE to assume contractual obligations for accepting waste on a defined schedule demanded an assured funding source to support the activities needed to meet these legal obligations.

The Commission concluded that for the waste management program to succeed, the nuclear waste funding mechanism must be allowed to work as intended so that the ability to implement the waste program is not subject to unrelated federal budget constraints. If that is not done, key recommendations of the Commission will be undermined— e.g., efforts to

develop both storage and disposal facilities will be in conflict rather than mutually supportive and commitments to provide benefits to host communities over the life of the program will lack credibility. Fixing this problem requires extricating the nuclear waste fee and NWF from the web of budget rules that have made these user-provided resources effectively unavailable to federal budgeters and appropriators, forcing them to take limited discretionary funds away from other federal programs in order to pay for the activities needed to meet federal waste management contractual obligations and thereby put an end to growing taxpayer financial liability for failure to meet those obligations.

To correct these problems, the BRC recommended that the handling of ongoing waste fee collections be fixed first. We made this recommendation because current federal budget rules and laws make it impossible for the nuclear waste program to have assured access to the fees being collected from nuclear utilities and ratepayers to finance the commercial share of the waste program's expenses.

At the current 1 mill per kilowatt-hour fee level, the \$750 million collected each year is more than sufficient to cover the expenses for a waste management program over the next several years. We suggested that this fix could be accomplished with two immediate actions: 1) the Secretary of Energy could amend the standard nuclear waste contract with nuclear utilities, which he is authorized to do under current law, so that utilities remit only the portion of the annual nuclear waste fee that is appropriated for waste management each year. The rest of the funding would be placed in a trust account, held by a qualified third-party institution, to be available when needed – and 2) at the same time, we recommended that the Office of Management and Budget work with the Congressional budget committees and the Congressional Budget Office to change the budgetary treatment of annual fee receipts so that these receipts can directly offset appropriations for the waste program. Taken together, these steps would make the nuclear waste program funding mechanism work essentially as Congress intended in the Nuclear Waste Policy Act, at least for future fee revenues. An advantage of taking these steps through administrative action in cooperation with Congressional authorizes is that any changes to fee revenues resulting from non-legislative action under existing law would have no PAYGO/CUTGO impact. At the same time, by ending the practice of counting revenues from the entire 1 mill/kwh fee in the federal government's budget baseline, this step would substantially ease the PAYGO/CUTGO burden associated with

subsequent legislative action to transfer fee receipts to an independent organization.

Mr. Rusco. As we reported in April 2011,<sup>11</sup> DOE and state officials and community representatives told us that the appropriations for DOE's Office of Civilian Radioactive Waste Management—the DOE office that was responsible for nuclear waste management at the time of the Yucca Mountain project—varied by as much as 20 percent from year to year, and its average annual shortfall of appropriations from its budget request was about \$90 million each year. Stakeholders, including former DOE officials, said that this made long-term planning difficult.

Subcommittee. To any of you who wish to answer: the Department of Energy's budget request released this week proposes that Congress continue to appropriate funding for program management, while the majority of activities—such as construction and licensing of a storage site—are automatically funded using Nuclear Waste Fund fees collected each year. What issues would this approach solve, and would it provide adequate congressional oversight?

Ms. Eisenhower. For the longer term, legislation is needed to transfer the unspent balance in the Fund to the new waste management organization so that it can carry out its civilian nuclear waste obligations independent of annual appropriations (but with congressional oversight)—similar to the budgeting authority now given to the Tennessee Valley Authority and Bonneville Power Administration.

Dr. Ewing. These issues are outside the Board's technical and scientific purview.

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<sup>11</sup>GAO-11-229.

## FUEL CYCLE CONSIDERATIONS

Subcommittee. Ms. Eisenhower, in our fiscal year 2010 budget hearing, Secretary Chu said that technological advances in the last several decades now warrant the consideration of fuel recycling, and he hoped that the Blue Ribbon Commission would consider that area. The Blue Ribbon Commission's final recommendations exclude anything on fuel cycle. Could you provide us any insight into why the BRC did not broach this topic?

Ms. Eisenhower. The BRC examined the issue of recycling and could not reach consensus. For that reason we concluded that any decision to pursue recycling should be deferred, but that the option to recover the energy value of at least some spent fuel should be preserved for future generations. We recommended the pursuit of R&D related to recycling so that such an option could be available in the future.



## QUESTIONS FROM CHAIRMAN FRELINGHUYSEN

### ACTIVITIES REQUESTED IN FISCAL YEARS 2014 AND 2013

Chairman Frelinghuysen. Dr. Lyons, the Department proposed quite a bit of work in its fiscal year 2013 request relating to consolidated interim storage and consent-based siting processes, and again you request funding in the fiscal year 2014 budget request for these activities. Many would argue that some of the activities proposed last year were unauthorized, and I'm very interested in discussing the work proposed in both 2013 and 2014.

I believe your request for fiscal year 2014 includes \$60 million for Used Nuclear Fuel Disposition activities. What specific activities does that request propose to fund?

Do any of the proposed activities support the siting of interim storage sites, or support activities in preparation of a siting process? What is your argument that those activities are authorized, or that they should be pursued before the Congress decides whether or not — and how — to change our nation's nuclear waste policy?

How are these activities in the 2014 request different than those proposed in the 2013 request?

Are you soliciting designs for consolidated interim storage facilities? If so, why do you believe this is authorized or appropriate before the Congress determines a direction?

You were additionally constrained in fiscal year 2013 because you're operating under a continuing resolution. Which of the activities proposed under Used Nuclear Fuel Disposition in the fiscal year 2013 budget request is the Department currently moving forward on?

**The Subcommittee notes that at the time of this printing the Agency has still not provided answers to the QFRs. The Department of Energy received questions from the Subcommittee on April 30<sup>th</sup>, 2013, one year prior to the printing of this volume.**

## CURRENT FUNDING ARGUMENTS AT COURT

Chairman Frelinghuysen. Mr. Weber, I was interested to see in the press that the NRC lawyers are arguing that it cannot review the Yucca Mountain application because we didn't include any funding in the recent CR to do so. I hope the courts are listening, because I think that argument is disingenuous at best.

Congress has appropriated funding for you to fulfill the law – that is, to complete the review of the Yucca Mountain license application. You still have funding to move the process forward, and if you need more, I would expect the NRC to act like any other responsible agency by requesting additional funding to fulfill the law.

Until recently, you claimed that you had \$10.3 million already appropriated to finish the application. I understand that you have revised that figure to \$13.4 million. What is the accurate number, and why the discrepancy?

Mr. Weber. Funds for Nuclear Regulatory Commission (NRC) activities related to reviewing the Yucca Mountain application are appropriated from the Nuclear Waste Fund, which was created by the Nuclear Waste Policy Act (NWPA) specifically to fund nuclear waste-disposal activities. 42 U.S.C. §§ 10222(c) and (d). The NWPA specifically states that the federal government's authority under the Act to obligate funds is "only to the extent or in such amounts as are provided in advance by appropriation Acts." 42 U.S.C. § 10105. Because the NRC has received "specific" appropriations from the Waste Fund for the purpose of reviewing the Yucca Mountain application, federal appropriations law prohibits the agency from using funds from any other source for this activity, *i.e.*, the NRC may not expend general appropriation funds to conduct the Yucca Mountain review if the Waste Fund appropriations are exhausted. Gov't Accountability Office, Principles of Federal Appropriations Law, Vol. I, 2-21 – 2-23, GAO-04-261SP (3d ed. 2004).

The NRC currently has approximately \$11.1 million in unobligated carryover funds appropriated from the Waste Fund and \$2.5 million in "obligated, unexpended" carryover funds appropriated from the Waste Fund, for a potential total funding amount of \$13.6 million.

The \$2.5 million of "obligated, unexpended" funds can only be used in

connection with the contract to which they were obligated and cannot be used at the agency's discretion until the auditing process associated with the close-out of these contracts is complete. If all of the \$2.5 million is recouped to the agency when the remaining, terminated contracts are audited, then the agency would have \$13.6 million in unobligated carryover funds. However, portions of the \$2.5 million may be required to satisfy the contracts in question, meaning that less than the \$2.5 million may be recouped. Thus, the NRC will not know how much of this amount, if any, will be recouped until completion of the auditing process.

The \$11.1 million is the amount of unobligated carryover funds available at the start of Fiscal Year 2012, supplemented by the amounts recouped from the termination of contracts associated with the Yucca Mountain proceeding following the closure of the NRC review of the DOE application.

As reported in the NRC's opening brief to the Court in January, 2012 the original amount of carryover funds was \$9.995 million. Subsequently, the NRC terminated and audited contracts associated with the proceeding and any money left over from those contracts has been recouped and added to the original amount of carryover funds. Accordingly, consistent with their obligations to the Court, NRC counsel have reported the changes in the amount of unobligated appropriated funds in various filings during the pendency of the case when that information has become available. The amount of \$13.6 million was provided to the Court in the NRC's most recent Status Report dated April 5, 2013.

Chairman Frelinghuysen. How much funding would it take for the NRC to finish the Safety Evaluation Report, which the NRC halted when it terminated the licensing process?

Mr. Weber. From receipt of the license application in June 2008, through the end of fiscal year 2011, the NRC spent approximately \$115 million of Nuclear Waste Fund appropriations on the license application review, including orderly closure activities in the final year. The NRC has received approximately \$581 million of Nuclear Waste Fund appropriations over 22 fiscal years for the repository project. As of March 31, 2013, the NRC has expended approximately \$567 million of these funds.

Chairman Frelinghuysen. After the SER is complete, how much additional funding would it take for the NRC to complete its review of the Yucca Mountain license application?

And just to give us some perspective on these numbers, how much total funding has the NRC spent to date on the Yucca Mountain license application?

Regardless of the future, there is much to learn from a finalized Yucca Mountain report and process. Are there any credible reasons to not complete and release the Safety Evaluation Report for Yucca Mountain?

Mr. Weber. The NRC has already captured much of the valuable information and insights within the closeout of the Yucca Mountain licensing program. As part of its orderly closure of the licensing review in 2011, staff completed three Technical Evaluation Reports, and more than 40 additional documents for knowledge capture of its review experience. While completing and releasing the Safety Evaluation Report (SER) may provide additional benefits in terms of knowledge management and public transparency, this document has a different purpose – to document the NRC staff's regulatory findings for: (1) licensing decisions on uncontested issues and (2) hearings on contested issues before the Atomic Safety and Licensing Board should Congress appropriate sufficient funds to resume the adjudicatory hearing. With respect to any uncontested issues, an SER is controlling and provides any license conditions deemed necessary by the NRC staff. With respect to contested issues, an SER is not controlling; instead, it reflects the findings of the NRC staff. The Board must reach its own independent conclusions on the merits of the application. In reaching its findings, the Board may consider the views of the NRC staff, which is one party before the Board, and those views will reflect the positions taken in the SER. If the Board and the NRC staff disagree on an issue in the application, the Commission may resolve the issue through the appeal process.

## STATUS AND HISTORY OF YUCCA MOUNTAIN

Chairman Frelinghuysen. Mr. Rusco, since Congress passed the law making Yucca Mountain the nation's nuclear waste repository, this Committee has invested in Yucca's development and licensing.

How much has been spent on Yucca Mountain thus far?

We asked this of the agencies themselves in the first panel, but we'd like to get your objective take, Mr. Rusco. How much did the Department of Energy and the Nuclear Regulatory Commission spend in the process of terminating the Yucca Mountain licensing application?

Mr. Rusco. We have not assessed the amount of money DOE and NRC spent on their termination efforts.

Chairman Frelinghuysen. The Administration and the Blue Ribbon Commission's proposed strategies are centered on "consent-based siting", and we'll dive into that in other questions. My chief concern is that many would say that Yucca Mountain could be considered consent-based, certainly from the perspective of the host community Mr. Rusco, can you walk us through some of the history of Yucca's siting process, as it relates to consent-based siting?

Mr. Rusco. None of the nation's efforts to develop a high-level waste repository are considered to be consent-based as per the Blue Ribbon Commission's recommendation for a consent-based approach. In addition, the Nuclear Waste Policy Act of 1982, as amended, did not require such a consent-based approach. However, in the Secretary of Energy's February 2002 recommendation to the President that Yucca Mountain be developed as the site for an underground repository for spent fuel and other radioactive wastes, the Secretary described the steps DOE had taken to inform residents and others. Specifically, DOE held meetings in the vicinity of the prospective site to inform the residents of the site's consideration as a repository and receive their comments, as directed by the act. The Secretary added that DOE went beyond the act's requirements for providing notice and information prior to the selection of Yucca Mountain.

## CONSOLIDATED INTERIM STORAGE

Chairman Frelinghuysen. At the core of the BRC and Department's proposals is the use of consolidated interim storage to hold spent fuel for 30 or many more years. Regardless of this or other temporary solutions, we'll need permanent repositories. This is why Yucca Mountain continues to be such an urgent matter.

And so the question is: Does interim storage get us anything, or does it create more challenges than benefits?

What does interim storage buy us? How does it help the situation?

Mr. Rusco. As we reported most recently in April 2013,<sup>12</sup> consolidated interim storage would allow DOE to consolidate the nation's nuclear waste after reactors are decommissioned, thereby decreasing the complexity of securing and overseeing the waste located at reactor sites around the nation and increasing the efficiency of waste storage operations. Interim storage would also allow DOE to begin addressing the taxpayer financial liabilities stemming from industry lawsuits. Interim storage could also prevent utilities from having to build additional storage for nuclear waste at operating reactor sites. In addition, interim storage could also provide the nation with some flexibility to consider alternative policies or new technologies by giving more time to consider alternatives and implement them.

Dr. Ewing. Sweden already has developed a centralized storage facility—CLAB—which has been operational for decades. Other countries, such as France, have operational reprocessing facilities where vitrified high-level radioactive waste is stored. Both the United Kingdom and Canada envision storage facilities as part of their long-term waste management plans. In short, consolidated storage facilities can be part of an integrated waste-management approach that necessarily will include a deep-mined geologic repository.

Chairman Frelinghuysen. Now let's talk about some of the risks and challenges of using consolidated storage sites. The Administration proposes

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<sup>12</sup>GAO-13-532T.

to open a repository by 2048, but what if that was delayed? What would happen to the interim sites, or their costs?

Mr. Rusco. Consolidated interim storage does present challenges. DOE has asserted that one key challenge is the uncertainty of its statutory authority to provide consolidated interim storage. Provisions in NWPAs that allow DOE to arrange for interim storage have either expired or are unusable because they are tied to milestones in repository development that have not been met. A second, equally important, challenge is the likelihood of opposition during site selection for a consolidated interim storage facility. Even if a community might be willing to host such a facility, finding a state that would be willing to host it could be extremely challenging, particularly since some states have voiced concerns that a consolidated interim storage facility could become a de facto permanent disposal site. Third, consolidated interim storage may also present transportation challenges. As we reported in August 2012,<sup>13</sup> it is likely that the spent fuel would have to be transported twice—once to the consolidated interim storage site and once to a permanent disposal site. The total distance over which the spent fuel would have to be transported would likely be greater than with other alternatives.

Dr. Ewing. Extended storage of spent nuclear fuel may present technical challenges. For example, over long time periods, degradation of spent nuclear fuel or the containers in which the spent nuclear fuel is stored may occur. Degradation mechanisms that occur over periods of more than 100 years are not well understood, especially for “high burnup” spent nuclear fuel.

Chairman Frelinghuysen. Do you believe it would be necessary to have penalties written into interim storage agreements in the event that the federal government missed the timeline to remove the waste?

Mr. Rusco. We have not evaluated that issue.

Dr. Ewing. This issue is outside the Board’s technical purview.

Chairman Frelinghuysen. Could having interim storage reduce the urgency of opening a repository? In other words, could it leave us stuck with interim storage forever?

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<sup>13</sup>GAO-12-797.

Mr. Rusco. As discussed above, some states have voiced concerns that a consolidated interim facility could become a de facto permanent disposal site. For example, in 2011, the Western Governors Association passed a resolution stating that no consolidated interim storage facility for spent nuclear fuel can be established in a western state without the expressed written consent of the governor.

Dr. Ewing. The possibility that a storage facility might become a repository will really only be eliminated when a deep-minded geologic repository begins operation. To the extent that policy-makers are concerned about this risk, they can establish links between the development of an interim storage facility and a repository.



WEDNESDAY, MARCH 20, 2013.

**MAJOR CONSTRUCTION PROJECTS, FY 2014 BUDGET**

**WITNESSES**

**Panel 1:**

**BOB RAINES, ASSOCIATE ADMINISTRATOR, ACQUISITION AND PROJECT MANAGEMENT, NATIONAL NUCLEAR SECURITY ADMINISTRATION**

**JACK SURASH, DEPUTY ASSISTANT SECRETARY, ACQUISITION AND PROJECT MANAGEMENT, OFFICE OF ENVIRONMENTAL MANAGEMENT, DEPARTMENT OF ENERGY**

**PAUL BOSCO, DIRECTOR, OFFICE OF ACQUISITION AND PROJECT MANAGEMENT, DEPARTMENT OF ENERGY**

**Panel 2:**

**DAVE TRIMBLE, DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT, GOVERNMENT ACCOUNTABILITY OFFICE**

**MIKE FERGUSON, CHIEF OF COST ENGINEERING, HUNTINGTON DISTRICT, UNITED STATES ARMY CORPS OF ENGINEERS**

**WILLIAM A. ECKROADE, PRINCIPAL DEPUTY CHIEF, OFFICE OF HEALTH, SAFETY AND SECURITY, DEPARTMENT OF ENERGY**

Mr. FRELINGHUYSEN. The hearing will come to order. Good morning, everyone. Thank you for being here.

Let me extend to Mr. Nunnelee, who is not here, my thanks for him sitting in for me yesterday when we had a hearing when I could not be present.

Today we have two panels before the Subcommittee to discuss the management of the Department of Energy's major construction projects that relate to our very important nuclear enterprise. For years, the Department of Energy has struggled to keep its contractor base, contractor-run projects within their cost, scope, and schedule estimates. This hearing will focus specifically on what reforms have been made and what else needs to be done to address the persistent problems the Department has had in managing its large nuclear projects.

Specifically, we will discuss the root causes of performance issues associated with the Waste Treatment Plant in Washington State and the Salt Waste Processing Facility under the Environmental Management Program and the MOX Fuel Fabrication facility both at Savannah River in South Carolina and the Uranium Processing Facility in Tennessee under the responsibility of the National Nuclear Security Administration (NNSA). Three of these projects are now undergoing a cost and schedule re-estimate, what we call a baseline review, to account for further delays, and a fourth is being redesigned. So we are anticipating greater costs above the approximately \$25 billion that has already been spent.

In our first panel we have three individuals who have been at the center of the Department's efforts to reform how these projects are being managed. Mr. Paul Bosco is the Director of the Office of

Acquisition and Project Management, which is the Department of Energy's central organization responsible for project management and cost estimating for the various program offices of the Department. Mr. Bob Raines is the Associate Administrator for Acquisition and Project Management for the National Nuclear Security Administration. Mr. Jack Surash is the Deputy Assistant Secretary for Acquisition and Project Management for the Environmental Management Program.

I believe this is the first time for all of you to testify before the Subcommittee, and we welcome you. All, I may note, have some sort of a Navy background. I checked their resumes very closely. Many years in the trenches on behalf of our country in a variety of roles. So we are very grateful.

In our second panel we will have Mr. Dave Trimble, Director of the National Resources and Environmental Group for the Government Accountability Office, aka GAO. Mr. Mike Ferguson, Chief of Cost Engineering for the Huntington District from the U.S. Army Corps of Engineers. And Mr. William Eckroade, Principal Deputy Chief of Operations for the Department of Energy's Office of Health, Safety, and Security.

The GAO has focused extensively on the Department's project management and has made a number of recommendations to encourage the Department to adapt better practices. The U.S. Army Corps of Engineers has also provided assistance to both NNSA and EM for several years now and continues to serve as a resource for new ideas and models to complete projects more effectively. The Office of Health, Safety, and Security is an independent oversight organization within the Department of Energy. It has also provided EM and NNSA with a number of recommendations on how its major projects are being managed with an emphasis on ensuring these complex nuclear facilities will meet standards for quality and safety for the foreseeable future.

We look forward to hearing from both of these panels on their recommendations that their organizations have made and how they will continue to work with the Department to improve project management.

Please ensure that the hearing record, responses to the questions for the record, and any supporting information requested by the Subcommittee are delivered in final form to us no later than four weeks from the time you receive them. We also ask that if members have additional questions they would like to submit to the Subcommittee for the record they please do so by 5 p.m. tomorrow.

With those opening comments I would like to yield to my ranking member, Ms. Kaptur, for any remarks she may wish to give. Ms. Kaptur.

[The information follows:]

**OPENING STATEMENT**

The Honorable Rodney Frelinghuysen  
Chairman, Energy and Water Development Subcommittee  
House Committee on Appropriations

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Hearing on the Budget for the  
Department of Energy's  
Office of Environmental Management  
March 20, 2013

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Good morning, everyone. Today, we have two panels before the Subcommittee to discuss management of the Department of Energy's major construction projects.

For years, the Department of Energy has struggled to keep its contractor-run projects within their cost, scope, and schedule estimates. This hearing will focus specifically on what reforms have been made and what else needs to be done to address the persistent problems the Department has had in managing its large nuclear projects. Specifically, we will discuss the root causes of performance issues associated with the Waste Treatment Plant and the Salt Waste Processing Facility under the Environmental Management program, and the MOX Fuel Fabrication Facility and the Uranium Processing Facility under the National Nuclear Security Administration. Three of these projects are now undergoing a cost and schedule re-estimate a "baseline review" to account for further delays and the fourth is being redesigned, so we are anticipating growth above what already totals approximately \$25 billion in costs to the taxpayer.

In our first panel, we have three individuals who have been at the center of the Department's efforts to reform how these projects are being managed. Mr. Paul Bosco is the Director of the Office of Acquisition and Project Management, which is the Department of Energy's central organization responsible for project management and cost estimating for the various program offices of the Department. Mr. Bob Raines is the Associate Administrator for Acquisition and Project Management for the National Nuclear Security Administration. Mr. Jack Surash is the Deputy Assistant Secretary for Acquisition and Project Management for the Environmental Management program. This is the first time you have testified before this subcommittee and we welcome you.

In our second panel, we will have Mr. Dave Trimble, Director of the Natural Resources & Environment group for the Government Accountability Office, Mr. Mike Ferguson, Chief of Cost Engineering for the Huntington District from the Army Corps of Engineers, and Mr. William Eckroade, Principal Deputy Chief of Operations for the Department of Energy's Office of Health, Safety, and Security.

The GAO has worked extensively on DOE project management and has made a number of recommendations to encourage the Department to adopt better practices. The Army Corps of Engineers has also provided assistance to both NNSA and EM for several years now, and continues to serve as a resource for new ideas and models to complete projects more effectively. The Office of Health, Safety, and Security, as an independent oversight organization within the Department of Energy, has also provided EM and NNSA with a number of recommendations on how its major

projects are being managed with an emphasis on ensuring these complex nuclear facilities will meet standards for quality and safety. We look forward to hearing from this panel on the recommendations their organizations have made and how they continue to work with the Department to improve project management.

Please ensure that the hearing record, responses to the questions for the record, and any supporting information requested by the Subcommittee are delivered in final form to us no later than four weeks from time you receive them. I also ask that if Members have additional questions they would like to submit to the Subcommittee for the record, that they please do so by 5:00 PM tomorrow.

With those opening comments, I would like to yield to our ranking member, Ms. Kaptur, for any opening comments that she would like to make.

Ms. KAPTUR. Thank you, Mr. Chairman. Gentlemen, welcome.

Today's hearing has been called to examine the Department of Energy's continued inability to manage major construction projects, an issue that has been an ongoing concern with this Subcommittee for a long time. I am deeply concerned by what I know of the cost overruns and schedule slips of the Department on its major construction projects. This year marks the 23rd consecutive year since 1990 that the Department of Energy's contract management has made the Government Accountability Office's High-Risk List for waste, fraud, and abuse. That is not a very good record.

I understand that the Department has made some progress, and we are anxious to hear about it. In its last report, the GAO states that it will shift its focus of the high-risk designation to major construction projects with values of \$750 million or greater. Still, these immense projects warrant the most prudent management and keen oversight of precious taxpayer dollars. The NNSA and EM currently manage 10 major projects with combined estimated costs totaling as much as \$65.7 billion. When I look at the NNSA budget it pales by comparison to that figure alone. This is a significant sum by any measure, more than double the 2012 Energy and Water bill itself. In an era of shrinking budgets, it is critically important that the Department get this right. And we know you have the major responsibility to do that.

GAO noted that the Department of Energy continues to demonstrate a commitment to improve contract and project management in NNSA and EM, and I expect to hear from you today about the Department's plans to address the remaining challenges for the successful execution of its construction projects moving forward.

Thank you, Mr. Chairman, for the time.

Mr. FRELINGHUYSEN. Thank you, Ms. Kaptur.

Mr. Bosco, front and center. Good morning. Thank you.

Mr. BOSCO. Good morning, sir. Thank you.

Mr. FRELINGHUYSEN. I know you have some remarks and if you have some lengthier remarks I am sure we will be happy to put those in the record. But the time is yours.

Mr. BOSCO. Thank you, sir. Good morning, Mr. Chairman, Ranking Member Kaptur, and Distinguished Members of the Subcommittee. Thank you for having me here today to discuss the Department of Energy's management of our largest construction projects.

My name is Paul Bosco. I am the Department of Energy's Director of Acquisition and Project Management. I report directly to the Director of Management, Ms. Ingrid Kolb. I serve as the Department's primary point of contact on all matters relating to project management. I also serve as the Deputy Secretary's Secretariat on the Energy System's Acquisition Advisory Board for all major systems projects. I am a registered Professional Engineer, a certified Project Management Professional. I serve as a member of Project Management Institute's Global Executive Council, and I have been with the Department of Energy for six years. As already noted, previously, I served for 28 years with the United States Navy as a Civil Engineer Corps Officer, predominantly overseeing construction projects. My last assignment was as the Operations Officer

here in Washington, D.C., at the headquarters of the Naval Facilities Engineering Command.

Within the Department of Energy, among other things, I am responsible for project management policy, guidance, and oversight. More specifically, I coordinate and oversee all of the Departmental project management directives to include our project management orders and our guides. In the context of oversight, my functions include: monitoring adherence to those project management directives; the maintenance of all Departmental project management metrics; the execution of external independent reviews on our largest projects, including the conduct of independent cost estimates and cost reviews; and the publication of our monthly (Red, Yellow Green) project status report for all active Department of Energy projects. I also serve as the Department of Energy's senior procurement executive.

As already noted, since 1990, as I am sure most everyone in the room knows, the Department of Energy has been on the GAO High-Risk List for contract and project management. During the past several years our senior leadership has focused their attention on this matter, committed to making improvements. The Department started and completed several initiatives to improve contract and project management, including a Root Cause Analysis and a Corrective Action Plan that was completed in 2008; a Deputy Secretary Contract and Project Management Summit which was convened in December 2010; and numerous Deputy Secretary Policy directives, including most recently a December 2012 memorandum entitled, "Aligning Contract Incentives for Capital Asset Projects," that reinforced greater accountability for all parties.

DOE is making progress. In May 2011, many of our project management reforms were codified within our updated project management order. Our most significant enhancements include: a new Departmental "Project Success" standard and other project management metrics; improved project upfront planning with greater design maturity standards; and new requirements, more stringent requirements for Independent Cost Estimates and Independent Cost Reviews, at our key critical decision points.

So, how are we doing? Have these reforms had an impact? The answer is a resounding "yes." The reforms are working. The most recent GAO high-risk updates bear that out. In 2009, NNSA and EM were focused and included on that list. Most recently, as noted, GAO narrowed that focus on NNSA and EM major projects and major contracts valued at or above \$750 million.

I concur with GAO's updates. We are doing better, but we have more to do. DOE's largest, most complex construction projects have been our greatest challenge. Our new project management reforms were not in place when their cost and schedule baselines were established. We must continue; we will continue to work towards improving project execution on our largest, most complex projects.

Thank you, Mr. Chairman and Subcommittee Members for the opportunity to appear before you today. I stand ready to answer any questions you might have.

[The information follows:]

**Statement of Paul Bosco  
Director, Office of Acquisition and Project Management and  
Senior Procurement Executive  
U.S. Department of Energy  
on  
Department of Energy's Major System Construction Projects  
before the  
Subcommittee on Energy & Water Development  
House Committee on Appropriations  
March 20, 2013**

Good morning Mr. Chairman, Ranking Member Kaptur and distinguished members of the Subcommittee. Thank you for having me here today to discuss the Department of Energy's management of our largest construction projects.

My name is Paul Bosco. I serve as the Department of Energy's Director of Acquisition and Project Management. I report to the Director of Management and serve as the Department's primary point of contact on all matters relating to project management and I serve as the Deputy's Secretariat on the Energy Systems Acquisition Advisory Board for all major systems projects. I am a registered professional engineer, a certified Project Management Professional and a member of the Project Management Institute's Global Executive Council. I have been with the Department for over six years. Previously, I served as a U.S. Navy Civil Engineer Corps Officer for nearly 28 years, most of that time overseeing construction projects. My last assignment was as the Operations Officer at the Headquarters of the Naval Facilities Engineering Command here in Washington.

Within the Department of Energy, among other things, I am responsible for project management policy, guidance and oversight. More specifically, I coordinate and oversee all of the Departmental project management directives, to include our project management Orders and Guides. In the context of oversight, my functions include: monitoring adherence to our project management directives; the maintenance of all



Departmental project management metrics; the execution of External Independent Project Reviews for our largest projects, including the conduct of Independent Cost Estimates and Reviews, as appropriate; and the publication of our (Red/Yellow/Green) monthly project status report for all active Department of Energy (DOE) projects. The report gets distributed to our senior leadership and our project dashboard is available to the public on the Department's website. Within this monthly report, we highlight our Red and Yellow projects, those that we believe will, or may, breach their current cost and/or schedule baselines, respectively. Our reports include, among other things, estimates to completion, if available, contingency dollars remaining, and a separate, independent assessment from one of our project analysts. With few exceptions, the analysts are professional engineers, project management professionals, have years of construction management experience, and many are cost engineers certified by the Association for the Advancement of Cost Engineering, International. I also serve as the Department of Energy's Senior Procurement Executive.

My intent this morning is to provide some project management background and historical context; update you on our recent progress, and on recent measures we have under taken to reform project management policy and guidance; highlight some metrics that demonstrate improvement, based on those reforms; and, in closing, I will outline areas that I believe may need additional attention going forward.

Since 1990, as I am sure many of you are aware, the Department of Energy has been on the GAO High-Risk List for contract and project management. At the turn of the century, numerous reports indicated that nearly half the time, the Department was unable to deliver projects within the original performance baseline – in terms of scope, cost and/or schedule. During the past several years, our senior leadership has focused their attention on this matter, committed to making improvements. The Department started and completed several initiatives to improve contract and project management, including a Root Cause Analysis and Corrective Action Plan completed in the summer of

2008; a Deputy Secretary Contract and Project Management Summit which was convened in 2010; and, numerous Deputy Secretary Policy directives, including most recently a December 2012 memorandum entitled, "Aligning Contract Incentives for Capital Asset Projects", that reinforced greater accountability for all parties.

DOE is making progress. In May 2011, many of our project management reforms were codified when our updated Departmental Directive on "Program and Project Management for the Acquisition of Capital Assets", DOE Order 413.3B, became effective. Our most significant enhancements include: A new Departmental "Project Success" standard and other project management metrics; improved project up-front planning with greater design maturity standards; a new project staffing model; new requirements for Independent Cost Estimates (ICE's) and Independent Cost Reviews (ICR's) at key Critical Decision points; a new and more robust Project Assessment and Reporting System (PARS); and, finally, periodic Project Peer Reviews Department-wide to better monitor project development, and project execution performance during the life of a project.

Organizationally, to improve alignment, the project management and contract management oversight offices at the Department: the Office of Engineering and Construction Management (OECM) and Office of Procurement and Assistance Management (OPAM), respectively, were merged to establish the Office of Acquisition and Project Management (OAPM). In May of 2012, I became the Director of this new organization. Similar consolidations were completed within NNSA and the Office of Environmental Management (EM) in FY 2011. Together we work collaboratively to address, implement and align the new contract and project management reforms. My colleagues from NNSA and EM are with me here today. The Department's focus on contract and project management improvement will continue with the goal of consistent and sustainable project implementation and success. The policy, guidance and organizational framework are now in place.

So, how are we doing? Have these reforms had an impact? The answer is “yes.” Perhaps most telling is our most recent project success metrics. To help tell the story, we segregated all recently completed construction projects, over the past three years, into two groups. Group A includes all those construction projects started and baselined before (FY) 2008. Group B included those construction projects that had their cost and schedule baselines established during FY08 and beyond. Group A had a 78% success rate; Group B had a 96% success rate. The reforms are working. The most recent GAO High Risk List Updates also bear that out. In 2009, only NNSA and EM were included on the list. Most recently, GAO narrowed their focus further to NNSA and EM major contracts and projects, with values of \$750 million or greater. I concur with GAO’s update. We are doing better, but we have more to do.

DOE’s largest, most complex construction projects have been our greatest challenge. All of them were baselined and started before we initiated any of our new project management reforms, with one exception, a Science Project, the “National Synchrotron Light Source – II” (NSLS-II) at Brookhaven National Lab. It was baselined in January 2008, at \$912 million. I am pleased to report that project is still being successfully executed, on budget and schedule. Our other active major projects, namely, the Waste Treatment Plant, the Mixed Oxide Fuel Fabrication Facility and the Salt Waste Processing Facility have had, and continue to have, challenges.

As DOE works with our contractors to identify the most economical and timely path for these projects, we will incorporate our latest project management reforms.

We must continue to work towards improving project execution on our largest, most complex projects.

In conclusion, going forward there are at least two areas that will garner my personal

attention and may require additional reform. I group those under two headings: 1) People and 2) Project Change Control.

People are our greatest asset. They are the greatest determinant of project success. We need the appropriate number and skill-set mix of Federal employees and staff support on each and every project to ensure the right balance of management and oversight throughout the entire life cycle of each project. Getting the right number of staff with the requisite skills, properly aligned at the right time to obtain optimum results can be challenging. I personally believe we have more work to do in this area.

Change control; we need to ensure that project changes during execution are held to a minimum, and when they must happen, we explore possible project cost off-sets. Enhanced up-front planning and project documentation and a design code of record will help, but a disciplined change control process must become the norm for greater cost and schedule control.

Thank you, Mr. Chairman and subcommittee members, for the opportunity to appear before you today. I stand ready to answer any questions you might have.

Mr. FRELINGHUYSEN. Thank you, Mr. Bosco.

Mr. Raines. Good morning.

Mr. RAINES. Good morning.

Chairman Frelinghuysen, Ranking Member Kaptur, and distinguished members of the Subcommittee, thank you for having me here today to discuss the steps the National Nuclear Security Administration has taken to improve acquisition and project management. More importantly, thank you for your continued support of NNSA's vital security mission. We could not do this important work without strong bipartisan support and engaged leadership from the Congress.

The NNSA's Office of Acquisition and Project Management was established in February 2011, and I became its Associate Administrator in August of 2011. APM substantially changes the way NNSA plans, estimates, and manages construction projects.

This reorganization encompasses four major areas. First, organization. Similar to project management organizations in the private sector and other federal agencies, APM is independent from the requirements owner and is fully integrated with an acquisition organization. Reporting directly to the Administrator, it shortens the chain of command for faster decision-making and provides an independent check on scope changes once requirements have been agreed upon. Our validation of budgets and schedules creates a healthy tension in the project execution process.

Second, we have developed new and improved processes for more effective oversight and selection of best value contracting strategies. Some examples include codifying the Administrator's position on 90 percent design completion prior to baselining our nuclear projects. Second, defining precisely what 90 percent design completion means. We have instituted independent peer reviews utilizing the best talent from across the complex, and we have revised our change control procedures to minimize scope creep.

Third, people. People are our most important asset. Our new organization and processes will only be successful with a well trained and motivated workforce. APM serves as the community manager for our federal project directors and contracting officers, ensuring they have the necessary training and tools to do their job effectively. When we do not have suitable experience training or numbers of people, we are augmenting our staff from the headquarters team using the U.S. Army Corps of Engineers or contractor support. We have partnered with DoD's Cost and Program Evaluation group for cost estimating expertise.

Fourth, culture. We are developing a culture of acquisition and project management excellence and a reputation as a professional owner. We believe this will expand the universe of companies that want to compete for our work, a culture that realistically and objectively assesses risk, questions optimistic assumptions, and uses quantitative data for decision-making, a culture comfortable in identifying problems early so they can be dealt with quickly and a culture that holds ourselves and our contractor partners accountable for poor performance. Because of the nature of our work, safety and quality will never be sacrificed. That said, we will make risk-based outcome-focused decisions to ensure we provide the best value to the taxpayer.

We are making progress. We have set clear goals and are meeting them. All projects completed in the last two years met the Department's cost goals that Paul had just talked about, and on a portfolio basis, finished 6 percent below the original budget. Although we will always work to improve safety and quality, our construction, safety, and quality records are enviable. I do not know any agency that has a higher percentage of OSHA-certified, voluntary personal protection sites as we do. Our high explosives pressing facility project at Pantex received the highest safety score ever recorded from the U.S. Army Corps of Engineers Tulsa District. For the fourth year in a row, our MOX project received the NRC's highest rating of no improvements necessary in their annual report.

Our projects were among the most difficult in the world. Their time horizons are long with supply chains that stretch around the world. We have the best companies in the world on our team. We are working closely with them to make sure they bring their most talented people to work on these projects. I believe the progress we have demonstrated on our smaller work is applicable and scalable to our major systems projects. There is more to do but we are on the right track.

Thank you again for having me here today. I look forward to answering your questions.

[The information follows:]

**Statement of Robert Raines**  
**Associate Administrator for Acquisition and Project Management**  
**National Nuclear Security Administration**  
**U.S. Department of Energy**  
**on**  
**Department of Energy's Major System Capital Asset Projects**  
**before the**  
**Subcommittee on Energy & Water Development**  
**House Committee on Appropriations**  
**March 20, 2013**

**INTRODUCTION**

Chairman Frelinghuysen, Ranking Member Kaptur, and distinguished members of the Subcommittee, thank you for having me here today to discuss the National Nuclear Security Administration's (NNSA) portfolio of major projects and the steps we have taken to improve acquisition and project management performance of our capital asset construction program. More importantly, thank you for your continued support of the Department and the National Nuclear Security Administration's vital nuclear security mission. We could not do this work without strong, bipartisan support and engaged leadership from Congress.

The National Nuclear Security Administration's Office of Acquisition and Project Management (APM) was established in February 2011 to provide integrated acquisition and project management services for the NNSA Enterprise in an effort to change the way NNSA does business and to ensure that we are making smart, responsible use of taxpayer dollars. Responsible to the Administrator for delivering capital work at the approved baseline, APM is similar to project management organizations in other federal and private agencies. APM is independent from the requirements owner, is fully integrated with the acquisition organization to ensure that best value acquisition plans are developed, and performs the necessary critical evaluation of a project's cost estimating, design and technical maturity, requirements definition, and change control for the Program Offices and Administrator. This new organization addresses the needs of NNSA – and needs that were also identified by Congress,

the GAO, and the Department – to strengthen and improve contract and project management by providing independent dedicated acquisition, project management, and oversight that aligns contract incentives with taxpayer interests; provides clear lines of authority and accountability for federal and contractor personnel; manages assigned projects within the original scope and cost baselines, ensuring completed projects meet mission requirements; improves cost and schedule performance; strengthens cost estimating, and alternative assessments and evaluation. We have drawn clear distinctions between Government and contractor employee responsibilities focusing on developing essential project requirements that are clearly delineated in contract documents and project execution plans, have strengthened change control procedures and authorities, and will perform as much construction work as possible via fixed price prime contracts or subcontracts.

Our efforts are paying off. Building on improvements in front end planning, estimating, and oversight, every NNSA project completed between 2010 and 2012 that was baselined after 2006 met the Department's success metric of completing within 10% of the original budget. Even better, 87% of them were completed at or under the original budget. Others have noticed our progress. In February 2013, the GAO changed their High Risk List focus for the NNSA to our major systems projects which have a total project cost of \$750 Million or greater. All NNSA projects with costs under \$750 Million were removed from the High Risk List. This shift is a direct result of our improved performance on delivering the smaller projects in our portfolio.

In another move to strengthen project management, NNSA's Federal Project Directors (FPD) were assigned to APM. We have committed to assigning certified FPD's to all projects at the point where the important planning and design work leading to baseline development is accomplished, known as Critical Decision One. We have also revised change control procedures to prevent scope creep. As the project progresses to the construction phase, we ensure the FPDs have the appropriate training, experience, and certification level to lead the project through successful execution. In those rare cases where they do not, we provide staff augmentation from the US Army Corps of Engineers and for technical support such as project



controls and cost estimating, from our Enterprise Construction Management Services support contractor. We have also adopted a peer review process to provide critical independent assessments of our work throughout the project life cycle, similar to the process that has been successfully used by the Department of Energy's Office of Science.

In addition, our federal project directors are also certified Contracting Officer Representatives. This ensures they have a sound understanding of the Federal Acquisition Regulations and have a broad knowledge base with which to communicate performance expectations under the contract with our contracting officers and contractors to ensure we deliver on the expectations identified in our contracts and work authorizations.

As the Acting Administrator has said, hiring the right people and giving them the tools they need to do their jobs well is one of the most important things we can do to improve management practices at NNSA.

Finally, through our better alignment with the acquisition organization in the NNSA, we have improved accountability to the taxpayer by utilizing the terms and conditions of the contract to the greatest extent practicable if our contracting partners do not deliver the expected results. Our contractor partners are the largest and most successful design and construction companies in the world, and we have selected them to work on our projects because of their performance in delivering difficult state of the art facilities on time and on budget. But by more clearly defining our expectations, strengthening our contract deliverables, and appropriately sharing risk and accountability, we are seeing more focused leadership attention from the parent companies of the contractors who perform our construction work. They are utilizing corporate reach-back and have brought in more experienced talent to replace or supplement their staff on projects that are not performing well.

I believe that our new organizational alignment, focus on improving the skill sets of our staff, more rigorous implementation of front end planning, risk management, construction oversight,

and accountability that led to the improved performance on these smaller projects are applicable and scalable to our major systems projects. We have also partnered with DoD's Cost Analysis and Program Evaluation group for cost estimating expertise.

For example, the Uranium Processing Facility and the Mixed Oxide Fuel (MOX) Fabrication Facility are both major NNSA construction projects that would be viewed very differently if they had been started today using our current approach. They will certainly benefit moving forward, but the issues we see today are issues that would not be replicated moving forward.

As the Acting Administrator testified, the MOX project was baselined and construction was started utilizing methodologies that we have since rejected. Specifically, the design for the facility was not sufficiently complete to develop an accurate and credible cost estimate. As has happened many times in large scale projects both public and private there was a tendency towards optimism in developing project estimates, assessing and assigning risks, identifying and locking in project requirements, and evaluating and monetizing the cost and schedule impacts of building a first of a kind hazard category 1 nuclear facility under NRC requirements, when such a facility had not been designed or constructed in the United States in over 30 years. Finally, we did not assign it to a project management and acquisition professionals organization and perform periodic independent oversight of the work utilizing the best talent available across the enterprise.

Such over optimism would be much more difficult today. We have worked hard to address these issues as we move forward with the Uranium Processing Facility. We challenged our optimistic assessments by looking at the lessons learned across the complex in cost estimating and risk management requiring our project team to use actual commodity installation rates, more realistic escalation rates, appropriate quality control and project management costs, and reasonable risk models based on our recent experience unless there is a credible, substantive reason to use more optimistic estimates. These processes led us to see that the cost range established in August 2007 was no longer achievable. Working with the National Laboratories,

Office of Defense Programs, and our Management and Operating Contractor we reviewed the original project requirements and developed a new scope and cost range that focused on our critical mission.

The Acting Administrator has committed to ensuring that the necessary front end planning for UPF is accomplished and design of the nuclear facility is 90% complete before establishing a project baseline. To better manage the important design phase of the project, we have required development and approval of a complete design baseline that we are managing with our project controls system. We carefully evaluated the full suite of work in the UPF project and have developed several infrastructure sub-projects that can be fully designed, baselined, and started this year to take advantage of today's favorable construction market, allowing us to ramp-up our project management work force efficiently and use the Army Corps of Engineers as our construction agent at a better value to the Department. We have reviewed and improved our risk management process to more critically understand potential risks, and are updating their cost and impact as the project design continues to mature. We are aware that with the large number of staff working on a project of this size, decision making must be streamlined. We have instituted a weekly call among the key project team members to raise high impact issues that require leadership decisions, have instituted a monthly senior Integrated Project Team in which the executives for all functional areas are briefed by the federal project director, where issues requiring resolution by their staffs are highlighted and managed. We have worked with the federal and contractor workforce to reemphasize the principles of the safety-based work culture, encouraging issues to be raised early so they can be resolved as quickly and economically as possible.

Lastly and most importantly, we have clearly articulated our expectations to our contractor partners and are using the contract to hold them accountable for deficient work. In FY 12, the UPF project team did not meet its commitment to deliver the 90% design on schedule, primarily due to the process systems requiring more floor space and building height than anticipated, necessitating a significant redesign effort. The NNSA paid zero fee for this design deliverable in

FY 12 and we have notified the contractor that we are reviewing other areas of potential cost recovery. Additionally, we clawed back \$4 million in fee paid in FY 11 on the WSB project at Savannah River, and negotiated a bilateral cost reduction of \$10 Million on the NMSUPP project in Los Alamos.

We are at the beginning of instituting our new organizational construct and are committed to developing credible project baselines, reviewing projects progress, interacting with our contractor partners, and delivering on our cost and schedule commitments. I believe we are making good progress, and look forward to answering your questions.

Mr. FRELINGHUYSEN. Thank you, Mr. Raines.

Mr. Surash.

Mr. SURASH. Thank you, sir. Good morning, Mr. Chairman, Ranking Member Kaptur, and members of the Subcommittee.

Thank you for having me here today to provide you with an update on the Department of Energy's Office of Environmental Management (EM) major system construction projects and the progress in implementing contract and project management reforms.

I am Jack Surash, Deputy Assistant Secretary for Acquisition and Project Management within the Office of Environmental Management. I am also a registered Professional Engineer. I have been with the Department about seven years, and previously, I served in the Navy, as it has been noted, in the Civil Engineer Corps for almost 28 years.

Within EM, I am responsible for project management assistance, independent project oversight, and performance evaluation. I am also responsible for effective and efficient operation of the procurement functions within EM, and management of the closeout of EM's program for the American Recovery and Reinvestment Act of 2009.

I am very pleased to report that EM has been making steady improvements in project and contract management, areas that the GAO has designated as a governmental high risk for many years. Based on results we achieved, coupled with our continued efforts and commitment by top leadership to address contract and project management weaknesses, GAO in its February 14, 2013 high-risk updated stated, and I am quoting, "GAO is further narrowing the focus of its high-risk designation to major contracts and projects, those with values of at least \$750 million, to acknowledge progress made in managing smaller value efforts."

Based on lessons learned from analyzing root causes of our project and contract management weaknesses, we have put in place new policies and guidance that require strict adherence to several things. These changes are already bearing fruit. Let me mention a couple of those.

The most important change is the requirement to assure proper upfront planning has been conducted so that the requirements are clearly identified and the appropriate design maturity and technology readiness have been achieved. We also need to ensure that safety is fully integrated into design early in the project and require that project design be 90 percent prior to establishing the project baseline. We also engage our internal/external oversight organizations, such as the Department of Energy's Office of Acquisition and Project Management led by Paul, and the Defense Nuclear Facilities Safety Board at every critical stage of the project to ensure their expertise is incorporated early in the process. We want to make sure that our contract requirements are clearly defined prior to issuing a solicitation for a construction project.

We also want to first consider the use of a firm fixed-price contract to complete work requirements in order to cap the government's cost liability.

We have put in place objective performance measures to the maximum extent possible to incentivize optimal contractor performance and to reduce costs.

We have expanded the use of project peer reviews following a process similar to the Department of Energy's Office of Science. We have also partnered with the U.S. Army Corps of Engineers to obtain cost estimating services, as well as resources for our project peer reviews. We will also ensure that our projects are planned based on funding that is affordable and executable.

The Office of Environmental Management is continuing to make progress with the construction of two very large construction projects—the Waste Treatment and Immobilization Plant in Richland, Washington and the Salt Waste Processing Facility in Aiken, South Carolina. The Waste Treatment Plant is vital to the Department's efforts to treat the high-level waste at Hanford. Physical construction is approximately 62 percent complete, and currently we are focused on resolving technical issues with the Pretreatment Facility and the High Level Waste Facility. Over the last several months, the Energy Secretary and a number of top engineers and scientists have been reviewing the remaining technical issues impacting this project. We will fully resolve these issues prior to resuming full construction activities in these facilities; however, full construction continues on the remaining facilities that are not impacted.

Our other large construction project is the Salt Waste Processing Facility Project (SWPF). Physical construction on this project is approximately 69 percent complete as of today. There are no outstanding technical issues. In fact, we have a pilot version of this plant that has been in operation since 2008, and that plant has processed over 3 million gallons of waste to date. Unfortunately, delays in delivery of some key process components have resulted in a cost and schedule overrun, and we are presently working very closely with our contractor to identify the most economical and timely way to move forward.

Mr. Chairman and Subcommittee members, I thank you very much for the opportunity to appear before you today.

[The information follows:]

**Statement of J. E. "Jack" Surash  
Deputy Assistant Secretary for Acquisition and Project Management  
Office of Environmental Management  
United States Department of Energy  
On  
Department of Energy's Major System Construction Projects  
Before the Subcommittee on Energy and Water Development  
Committee on Appropriations  
United States House of Representatives**

**March 20, 2013**

Good morning, Mr. Chairman, Ranking Member Kaptur, and Members of the Subcommittee. Thank you for having me here today to provide you an update on the Department of Energy's Office of Environmental Management (EM) major system construction projects and the progress in implementing contract and project management reforms.

I am Jack Surash, Deputy Assistant Secretary for Acquisition and Project Management (APM) in the Office of Environmental Management (EM). I am a registered professional engineer and have been with the Department for seven years. Previously, I served as a U.S. Navy Civil Engineer Corps Officer for nearly 28 years. Similar to Department of Energy's (DOE) Office of Acquisition and Project Management and the National Nuclear Security Administration (NNSA) Office of Acquisition and Project Management, the EM Office of Acquisition and Project Management was established in February 2012 to provide integrated acquisition and project management services for the EM Complex. My office provides project management assistance, independent project oversight, and performance evaluation. My office is also responsible for effective and efficient operation of the procurement functions within EM, including the management of the closeout of EM's program for American Recovery and Reinvestment Act of 2009.

**Updates on Major Projects**

The Office of Environmental Management is continuing to make progress with the construction of its two largest projects -- the Waste Treatment and Immobilization Plant in Richland, Washington and the Salt Waste Processing Facility in Aiken, South Carolina.

The Waste Treatment and Immobilization Plant (WTP) is vital to the DOE's mission to treat and immobilize in glass the bulk of approximately 56 million gallons of radioactive waste stored in 177 underground storage tanks at the Hanford site. Physical construction on this project is approximately 62% complete. Currently, DOE is focused on resolving the technical issues with

the Pretreatment Facility and the High-Level Waste Facility. Over the last several months, the Energy Secretary and a number of top scientists and engineers have been reviewing many aspects of the project. Approaches are being evaluated to resolve the criticality, hydrogen generation, erosion/corrosion, and tank mixing issues. Technical teams were developed as a result of this review drawing upon expertise from academia, industry, and the Department's national laboratories. The Department is committed to resolve these issues in order to produce a high-confidence design and baseline for the Pretreatment and the High-Level Waste facilities of the WTP, prior to resuming full construction activities. While DOE works towards resolution of these technical issues, we expect to provide direction to the contractor to begin ramping-up construction activities in the High-Level Waste Facility in areas not impacted by technical issues.

For other parts of WTP, the Low-Activity Waste Facility, Analytical Laboratory and the Balance of Facilities (support facilities), full construction continues.

EM's second largest construction project is the Salt Waste Processing Facility (SWPF), which will process 31 million gallons of the liquid radioactive waste inventory at the Savannah River Site. Physical construction on this project is approximately 69% complete. A pilot version of the plant has been operational since 2008, and as a result we have high confidence in the technical capabilities of SWPF. To date, the pilot plant has processed over 3 million gallons of tank waste. Due to delays in the delivery of key facility components at acceptable quality levels for nuclear facilities, SWPF is experiencing cost over-runs and schedule delays. Since the delivery of the key facility components last year, we are working closely with our contractor to identify the most economical and timely path for completion of this project.

### **EM Has Made Progress in Implementing Contract and Project Reforms**

EM's contract and project management has long been designated a governmental "high risk area" by the Government Accountability Office (GAO). I am pleased to report that in the 2013 biennial update, the GAO narrowed the scope of its high risk designation, focusing on EM capital asset projects with costs greater than \$750 million. In the 2013 biennial update, GAO recognized EM management for demonstrating "strong commitment and top leadership support for improving contract and project management." I view our improvements as a journey and not a destination. A number of improvements have been made and we will continue to develop and apply further improvements in the future.

Key reforms EM has instituted include implementing policies requiring more front-end planning; ensuring federal project directors and contracting officers have access to relevant training to help enhance their contract and project management knowledge; improving cost estimating; conducting more frequent project reviews by peers and experts in project



management to ensure issues are identified early and lessons learned are being applied in real-time; selecting proper contract types; tying fee strategies to final outcomes; and restructuring our portfolio into smaller, better defined capital asset projects.

Additionally, we will adhere to the following guidance for contracts for complex nuclear capital construction projects:

- *Improved Upfront Planning.* We will assure proper upfront planning has been conducted so that requirements have been clearly identified and appropriate design maturity and technology readiness have been achieved and depending on the complexity of the project we now require 90 percent design completion prior to baseline approval. We will ensure that safety is fully integrated into design early in the project. We will make sure that contract requirements are clearly defined prior to issuing a solicitation for construction or major equipment purchases. We will also engage our internal and external oversight organizations such as Department of Energy's Office of Acquisition and Project Management and the Defense Nuclear Facilities Safety Board at every critical stage of project development to ensure their expertise is incorporated early in the process. We will also ensure the project is planned based on funding that is affordable and executable.
- *Contracting Strategy.* We will first consider the use of a firm-fixed-price contract to complete work requirements in order to cap the government's cost liability. When a firm-fixed-price contract is not the appropriate contract vehicle, we will incorporate contract clauses, such as liquidated damages (that provide an additional incentive for on-time delivery of products and services and make the Government whole for damages suffered as a consequence of non-performance), and ensure the contractor uses qualified and reliable sources for procurement of critical items. We will structure contracts such that all or a significant portion of the fee for interim milestones will be provided provisionally and must be returned if the contractor does not fulfill its ultimate contractual obligations. In cases where it is appropriate, and when the total cost to perform can be estimated with reasonable certainty, we will also use hard cost caps or a cost share approach to shift greater risk to the contractor.
- *Performance Measures.* We will put in place objective performance measures to the maximum extent possible to incentivize optimal contractor performance and reduce costs. We have also enhanced our performance reporting system to make actionable performance data available to each Acquisition Executive to maintain real-time situational awareness of costs, performance, and other important metrics so they can proactively engage and mitigate potential issues. We are also ensuring that contractor

performance continues to be reported into the Government's web-enabled contractor past performance database that is available for use in evaluating future contract awards. Finally, we will enhance the federal oversight of contractors to ensure products are delivered as specified on time and within budget.

- *Project Peer Reviews.* We have expanded the use of project peer reviews following a process similar to DOE's Office of Science. We have partnered with US Army Corps of Engineers to obtain cost estimating services as well as resources for project peer reviews.

#### **Areas that Still Need Attention**

Both WTP and SWPF were initiated over ten years ago long before we instituted these rigorous contract and project management processes. Applying the lessons learned over the last decade, we would have taken a different approach to WTP and SWFP. However, at every opportunity, we ensure the lessons from our new initiatives are being applied to these projects. Areas we are currently focused on include: resolving technical issues that have impacted the progress on the WTP, contract negotiations consistent with the Deputy Secretary's guidance on contractors accountability for their actions, and establishing new revised baselines for both projects.

#### **Conclusion**

Mr. Chairman, Ranking Member Kaptur, and Members of the Subcommittee, I am honored to be here today representing the Office of Environmental Management. EM is committed to achieving our mission and will continue to apply innovative environmental cleanup strategies to complete work safely, on schedule, and within cost thereby demonstrating value to the American taxpayers. I am pleased to answer any questions you may have.

Mr. FRELINGHUYSEN. Thank you for your testimony. Thank you all for your testimonies. You are here this morning because you represent part of a reform movement here. The Committee has been obviously aware of directives and corrective action plans probably that have been coming up each and every year for the last 20 years. But you have been in the vanguard of the implementation. I assume you are not satisfied with where we are today. The statistics, the latest report of the Department, and I want to be complimentary because you are here and we want to recognize the significant effort each of you individually have done, and collectively it represents a lot, but if you look at the latest report of the Department of Energy, 8 of the 15 active EM projects had an unacceptable status representing I think \$14 billion in costs; 3 of the 14 active NNSA projects were considered unacceptable representing about \$5 billion in costs. And that does not count the Uranium Processing Facility at Oak Ridge because it still does not have a proper baseline. So you are not satisfied. And I would like to get an answer from you as to what more we can do here. The costs here are staggering. They are unacceptable to you. They are unacceptable to us. I think the taxpayers are wondering what is going on. That is really the purpose of this hearing here. We are on your side but we would like to hear from each of you individually some more on that issue.

Mr. RAINES. I would be happy to start. You are correct. We are not satisfied, and I think that is one of the reasons why in the NNSA we set up this new organization that has direct access to the Administrator, the most senior leader in the NNSA to make sure that his vision—I am sorry, her vision—is being promulgated to our staff and to our contractors. We believe that what we are doing today is going to make a vast improvement. On the projects that are not performing well, we are working with our contractors very, very closely to have them bring the right people to bear on the problems and to hold them accountable through the terms and conditions of the contract to the greatest extent practicable.

Mr. FRELINGHUYSEN. You have the right people, have you not? Are you suggesting we do not have the right people?

Mr. RAINES. No. In some instances—

Mr. FRELINGHUYSEN. It is a remarkable workforce here.

Mr. RAINES. From our contractor workforce. So to be clear, the right people that we are talking about, the projects that we have had problems with, as we talk with our contractor partners, we have made substantial changes in both the project management personnel, the project controls personnel, and the construction management personnel. As we have stated, we can have the best processes in place, but if the people who are implementing them are not the right people for those particular jobs, then we need to have them put better people on the project. And they have done that for us.

Mr. FRELINGHUYSEN. Mr. Bosco.

Mr. BOSCO. Sir, I agree with you 100 percent.

Mr. FRELINGHUYSEN. You guys are in the driver's seat here. We like you. We commend what you do. Give us some confidence that we are going to see a sort of—

Mr. BOSCO. So here is some assurance for you, sir. I am in the policy guidance oversight business. The reforms that we have made are in place. They are in our orders. They are in our guides. Now it is time to implement. So what has changed?

So here are some big things that have changed. I believe for the first time ever, and again, I am relatively new, six years at DOE. We now have established Department-wide project success metrics. My office has become the central repository for all of our project data and information. So my colleagues from NNSA and EM, they can do all the statistics they like, and they do. But at the end of the day we submit quarterly reports to GAO and OMB on the information that we retain, and we serve as the, if you will, the umpire on whether a project is meeting our project success standards and whether they are being delivered, and they are conforming to our new policy.

Mr. FRELINGHUYSEN. Now, is that substantially different than what was occurring before?

Mr. BOSCO. Sir, in the past there were standards measured by each program in NNSA. To my knowledge there was never an overarching, one departmental standard with an independent reviewer that would validate and hold all of that project information. And some of the other improvements we have made in that regard, we have a much more robust project assessment and reporting system. What does that mean? That means that the project cost and the project schedule systems that our contractors use at their sites, and we have a process called earned value management system, for example, which is how we track variances on cost and schedule, we now have a system that every month they upload into a data warehouse. And so we are all looking at the same information that our contractors have at their sites at headquarters, and it allows us to drill down and take a look at specific control accounts to more readily identify problems. And I have people on my staff that do those reviews, as does Bob, as does Jack. So we do have a much more robust analysis from one central repository.

Mr. FRELINGHUYSEN. Before going to Ms. Kaptur, Mr. Surash, get your oar in the water.

Mr. SURASH. I am also not happy with where we are at, sir. But I am confident we will do better as we go forward.

Mr. FRELINGHUYSEN. I want you to know we have heard that quite a lot here on this panel. I have been on this panel a long time. We are here because we want you to succeed. So tell me. Give me even more confidence than you are giving me at the moment here.

Mr. SURASH. So, the various ideas and reforms that you have heard about, for the projects and contracts underway, we are going to implement those ideas to the greatest extent we can. For salt waste processing, we are in kind of a cone of silence period here because we are in active negotiations with the contractor. But as a for instance, when we have had to rebaseline a project, in the past I do not feel we have done the proper job of doing an integrated project and contract change procedure. So what we are doing right now is we are working with the salt waste processing contractor; we are actually negotiating the overrun—how much more it is going to cost and how much longer it is going to take.

That is step one. As that is being done in parallel, we are applying the procedures to it, and only then will we get to a new projected cost and schedule. So that is stuff we have not done as good of a job before.

Mr. FRELINGHUYSEN. Ms. Kaptur.

Ms. KAPTUR. Thank you, Mr. Chairman.

Following on your excellent line of questioning, let me ask Mr. Bosco, Mr. Raines, and Mr. Surash, when you assumed your positions and you took a look at what you were expected to do, what were the worst examples you found that took your breath away in terms of cost overruns? And what did you say to yourself?

Mr. BOSCO. The biggest surprise I had, ma'am, when I came in was the monetary figures. They were in the billions. I was very surprised in my first project reviews where people would sit down across from me and propose to me, establishing projects that were in the multi-billions of dollars with decades of timeline. And so that was my biggest surprise. So one of the initiatives we have taken is to try to disaggregate large projects and make them more discreet, complete, and usable facilities within themselves to reduce the time horizons which by just doing that alone reduces risk. And it also allows us to establish much more clearly very discreet funding profiles.

And so my biggest surprise was the size and how long the projects were and that we seemed to group many, many types of facilities together under the banner of one project.

Ms. KAPTUR. Do you think the problem was that we did not know what we were doing scientifically? Or technically we did not have the trained workforce? That the schedules for completion were unrealistic? The projects were ill-defined? As you look at the amounts of money that were projected to be spent, what is at the basis of the inaccurate estimates of cost? Do you think people who were put in charge just simply did not know how to handle the project?

Mr. BOSCO. Ma'am, I really cannot. I was not there when all of this occurred. I would only be speculating on what was sort of at the root cause of all of this. For me today, the root cause and the biggest challenge going forward is one of culture. We have all of the policy guidance reforms in place. The organizational framework in place. Now it is a matter of implementing. And as Bob alluded to, making changes to the culture to add in this more rigorous disciplined project management process.

Ms. KAPTUR. Unless you have actually been inside the culture, it is hard to understand what you really mean. If you were to say that to 100 people that I represent, nothing sticks to the wall of what you are saying to me. It is hard for me to express to them, okay, fine, so we have to change the culture. So what does that mean?

Mr. BOSCO. I think what most people would tell you is the history of the Department of Energy, rightfully so, when it stood up out of the Manhattan Project because of the secrecy and everything that evolved with that, there was a very strong reliance on our superstar contractors Bob alluded to. We have world-class contractors. So perhaps over time there has been an overreliance on our management and operating contractors. And over time sort of the federal expertise perhaps has eroded. And I think at this juncture

we are trying to sort of swing the pendulum back to a more disciplined appropriate federal management and oversight.

Ms. KAPTUR. Before I turn to the other gentlemen for any comments they want to make, do you have incentives, or what types of incentives do you have for completing projects on time, or under budget, or even ahead of time while safeguarding worker safety?

Mr. BOSCO. So that gets actually to the recent Deputy Secretary policy memorandum. And I can only speak to contract actions going forward because obviously contracts that are in place today already have provisions that were negotiated many, many years ago. Going forward, some of the key provisions that we are going to be looking for, especially on a large capital asset project that goes over the course of many years. Today, we are providing interim fee payments when they reach interim milestones. Going forward, the Deputy Secretary has asked us to look at what is called provisional fee clauses, which basically says that at the end of the day if you do not deliver that finite project on budget, on cost, as we all agreed to, we have the ability to claw back that interim fee that you had been previously paid.

Ms. KAPTUR. Thank you very much.

Mr. Raines, Mr. Surash, do you want to add anything to this?

Mr. RAINES. Yes, ma'am. So the question of what were the biggest surprises. I think I am going to rephrase it a little bit when I came into the NNSA.

Several. First, we were very lax on requirements definition. The basis of a project is to understand what is the scope that you are going to buy because if we do not know exactly what we are going to buy, you can have the best estimating process in the world and the best management team in the world but the project continues to grow. So that is the first thing that we look at. How do we better define the requirement?

The second thing is having a reliable cost database. I think that many people were relying on standard cost databases with some multiplying factors that we would use for saying, well, we have not done this work for 30 years and it is nuclear work and it is very, very difficult, but since we had not built them for 30 years, we just went in and we underestimated. Today, we have a broad universe of projects that we have a lot of detailed data on. I will speak a little bit as to how we are using that now.

Third was poor change control. After we set a requirement, sometimes it will change. As soon as you change a requirement, the first thing the construction manager and a project manager should do is identify what do we think the cost and schedule impact for this new requirement is. Then the program manager will make a decision as to whether or not the business case supports doing that extra work or that work is not worth the value.

And then finally, I think to expand on the culture part, it is really revisiting the provisions in our contracts. A FAR based contract is generally the most powerful contract that any construction contractor that works for us will use. There are provisions in there for duty to proceed, disputes clauses, et cetera, that the Department in the past has been reluctant to use. So even though some of these projects have been baselined a very long time ago, what the NNSA has done is we started to take a look and said even if it is a cost

contract, the costs have to be reasonable. And if we have a very large overrun, as we have had on a couple of our projects, we have looked at the reasonableness of cost. And we have had bilateral negotiations with our contractors where they have agreed at our insistence to return costs to us because they did not perform as we expected.

The fourth thing is fee. Besides having provisional fee, which we have included those in some of our contracts, if we believe that we have paid fee inappropriately because the contractor's data integrity led us to make a bad decision, our contract, in fact, gives us the ability to pull that fee back. That can be disputed but we have done that recently. And if we see more actions where that is happening, we will continue to do that.

Ms. KAPTUR. I like the rigor of the way that sounds. I hope that in the implementation phase it works out that way.

I think we have probably gone overtime, so Mr. Surash, I will pick you up in the second round.

Mr. SURASH. Thank you, ma'am.

Mr. FRELINGHUYSEN. Mr. Simpson, I am the good cop. He is the bad cop, I think. Let's see what happens here.

Mr. SIMPSON. Like the chairman, I have been on this Subcommittee for 10, 11, 12 years, something like that. We have had this hearing with the Department for 10, 11, 12 years, and it is always "we will do better." And to tell you the truth, I do not understand what any of you said. I have a simple definition here of you come in or the Department comes in and wants to sell a project to Congress that we need to do. And we ask what is it going to cost and how long is it going to take? And it is estimated to be a billion dollars and take 20 years or 15 years or whatever to finish. And about two years later we are into \$3 billion. And about two years after that we are into \$6 billion. My definition of success is on time and on budget. Are we ever going to get to that point and stop holding these hearings about what we are doing wrong and how can we do better? I am not trying to be critical. I know you guys are trying to change the culture, that is going on out there with the contracting community. But I talk with a lot of people all over the country, contractors that deal with the Department of Defense, that deal with the Department of Energy and everybody else. I get more criticisms of dealing with the Department of Energy. There is more disconnect between contractors and the Department of Energy than any other department I have ever seen. Oftentimes I hear them say things like if they would just get the Department of Energy out of the way we could do our job and get this done.

So I guess I am just about as frustrated as you can be because obviously when we run billions of dollars over our estimated cost we have no way of being able to project what our budget is going to be for future years. I do not know that I have an answer in there or a question in there, but it is just frustrating for everybody that has been on this Committee for any period of time. And I look forward to getting you off the High Risk list.

Mr. BOSCO. The High-Risk List.

Mr. SIMPSON. Tell me, exactly what does being on the high-risk list mean? It is not a good thing I would assume.

Mr. BOSCO. Sir, the high-risk, and I know GAO is behind me and I am sure they will correct me perhaps at the second panel, but my understanding is if there is a potential for fraud, waste, abuse, or mismanagement. I believe we fall into that last category since we have never been able to definitize or actually show any fraud and abuse. Arguably, there is some mismanagement. So that is what I believe being on the high-risk means.

Mr. SIMPSON. I suspect there has been waste. When we started the Waste Treatment Plant in Hanford, I believe that it was 10 percent engineered when they started construction of this. And I remember Mr. Hobson, chairman of the Committee then just went berserk. And consequently, we got to where it has to be 90 percent engineered now before you start construction. I also understand changes in mission and mission creep and all that kind of thing. I also understand that these are complex systems that are being built for the first time ever. If we go out and build a dam with the Army Corps of Engineers, we can pretty much tell you what a dam is going to cost because we built a whole lot of them. We have not built many waste treatment plants. And that is going to add some uncertainty to it. Our frustration is the uncertainty between a billion dollars and \$6 billion. I can flip a coin and come closer than that. That is what is frustrating for this Committee and that is why we hope that we can get a handle on this. And if we do not, it is going to be very difficult to get funding for a lot of these projects that are critically important to the future of this country.

Mr. BOSCO. Sir, so to that point, the biggest frustration, and I will speak for Bob and for Jack, our biggest frustration and disappointment is the largest projects are ones that predate us and they will continue for the better part of the next decade. And they will always be known as those projects with massive cost overruns and massive schedule delay. We would ask that you judge us on our most recent large capital asset projects coming out of the chute today.

So I will put Mr. Raines on the spot, but he will soon baseline and make a commitment to the Hill on the Uranium Processing Facility. And so the exact specific point estimate and number he will commit to is what we will deliver to. And we will use our new project management reforms to sort of give you that number and to give you that schedule.

As we rebaseline these largest projects, WTP, Salt Waste, MOX, we will implement and put in our new reforms. But again, when compared to the original number, the original baseline, it will be very hard to make a very complimentary statement on any of those projects.

Mr. RAINES. Mr. Simpson—

Mr. SIMPSON. Move your microphone up a little bit so we can hear you better, please.

Mr. RAINES. I agree that what the goal is, delivering on budget and on schedule. That is also the Administrator's goal. It is what our stated goal is to all of our contractors. And in fact, when we say we want to deliver on time and on budget, it is not the TPC, the total project cost which includes some contingency that the government puts in, but we expect them to deliver on the contract deal that we make with them. And those contingencies should only be



used as a last resort. So that is the first point I want to make sure. We are absolutely in alignment.

Secondly, there is some good news. I am going to give you just three projects that we are working on.

Mr. FRELINGHUYSEN. Would you yield? Are you committing to the baseline that he suggested you are going to?

Mr. RAINES. I will get to that when we do a baseline. But we have three projects today. The Radiological Equipment Installation Project at LANL, a \$199 million project that is scheduled to be completed on budget. We have the High Explosive Pressing Facility Project at Pantex, a \$145 million project that is 50 percent construction completed, and we are delivering that project at about \$20 million under budget today. And then we have baselined our first hazard category 1 Nuclear Project, the TRU Waste Facility at LANL using these new procedures, understanding what the costs were to baseline that work, and so we will be able to monitor that.

On the Uranium Processing Facility, one of the things I know that has caused concern is the cost increase that we have reported to the Committees, but the reason that we did that is that is an accurate, credible estimate as to where we are today. So as we looked and saw what it really started to cost us to build the Waste Treatment Plant, the Salt Waste Processing Facility, and the MOX Facility, we saw that the unit cost that we had reported back in 2007 were unachievable. We wanted to make sure that we let everybody know what the budget was because we agree that budget stability is very important. We cannot do our work either if we have to continually change our budgets to meet these cost growths. The Administrator knows it. The program officers know it. And so by having a credible estimate as early as we can to target to, we think we will do a much better job.

Mr. SURASH. Sir, on the Salt Waste Processing Facility, that was rebaselined over four years ago, at one point \$1.3 billion and a completion in 2015. And unfortunately, what has happened there is really the prime contractor had problems getting subcontractors to provide the process vessels. In fact, they had to terminate the first subcontractor, recompet, and get a second subcontractor.

Ms. KAPTUR. Excuse me. Would the gentleman yield? Would the gentleman yield on that point?

Mr. SIMPSON. Sure.

Ms. KAPTUR. When you say the first contractor could not do the job, was the problem a scientific problem? What was the nature of the problem?

Mr. SURASH. Thank you, ma'am. I think this is kind of a sign of the state of the nuclear supply chain in this country.

Mr. FRELINGHUYSEN. Maybe it was a sign of the Department not knowing what is going on.

Mr. SURASH. The requirements, the technical requirements, were not changed in this situation. The prime contractor, we thought, did an adequate job of finding a qualified subcontractor, and put him under contract. Unfortunately, they did not make sufficient progress. They did then recompet, and get a second subcontractor. They ended up producing the vessels with great quality. Thus far there are no known issues, but at the end of the day that caused a two-year slip in the project. And that is really the single issue,

the root issue that we are dealing with today. The design on that project was sufficiently matured. The technology was matured. A pilot plant was in operation, so some of the good ideas I think you have heard here today were actually done on that project, but very unfortunately it was a subcontractor's failure to be able to produce these vessels. Very large vessels, as big as this room, about 10 of them that caused this project to have a price increase and a schedule increase.

Mr. SIMPSON. Back to the other part of my question, and I hear this all the time from contractors all across the country. What they generally tell me is they do not want to work for DOE anymore because they said it is just a government maze there. I hear that from subcontractors. Obviously, some of them probably are not qualified to do it. What about that relationship between contractors, subcontractors, and DOE?

Mr. SURASH. Let me, if I could, sir. We have been using environmental management contracts more similar to the Department of Defense for a number of years now so that we are not using the management and operations contract for the most part. Salt Waste Processing and WTP are normal federal acquisition regulation contracts.

We have always obtained lots of competition in the market when we have gone out, so there are big name companies that come forward. We had competition in 2000 on WTP. We had competition in 2002 on salt waste. So one of the things that we are doing after we get a contract in place is we are using a partnering kind of issue that really the Corps of Engineers started many, many years ago. So we are trying to strengthen the relationship at the site between the site manager and the president or project manager of that contractor. We are just after alignment, trying to bring forward or identify problems earlier, and have everybody agree that we are going to solve things at the lowest accountable level. And we are seeing some good results on that. The Salt Waste Project just recently put in place this partnering effort within the last couple of months. And we are starting to see good things on that.

Mr. SIMPSON. Well, these things need to be discussed and you need to know where we are coming from from an appropriations perspective. So I appreciate it.

Mr. FRELINGHUYSEN. Thank you, Mr. Simpson.

Mr. Nunnelee, thank you for your patience. Thank you for yesterday as well.

Mr. NUNNELEE. Thank you, Mr. Chairman. Well, I am glad to be back in this seat and not in yours.

You have reported that some of your challenges are finding qualified, skilled labor to actually do some of these construction projects. In fact, in some cases you have said you have had to build that from the ground up, including entering into partnerships to help train unskilled laborers. And then you have said a problem is that either they do not finish or if they do finish with the training, then they leave to go somewhere else after we have helped train them. And I guess I am fascinated because my son is in the Navy and his job with the Navy is to do well in dental school. And when he finishes, while he is active duty Navy today, he will go on assignment and fulfill that obligation. Can we not do something with

these folks we are training—similar to what Navy is doing with my son, saying that, okay, we are going to help train you, give you a skill, and then you owe us so many years after the fact?

Mr. RAINES. Well, sir, on the craft labor, which I think is the part that you are talking about, we are really not seeing a large exodus of craft labor from the projects. The kind of work that we are doing, it is the same skills that they would do for commercial construction but because the quality standards are higher, they have more training. For example, all welds are radiographed. And so a standard welder, you can have some flaws. You cannot have flaws in ours, so we have to set up a training program for the welders to be qualified so there will not be any rework. Once we train those folks, we generally are not losing them. Now, we have lost the senior engineers, and we are working with our contractors to put into place retention programs where if they stay on the job for a period of time they would get a bonus at the end. And so because they are already trained, unlike in the Navy where you are trading the time for the skill set, since these people are already qualified, they are degreed engineers, what we are doing is we are incentivizing them to stay on the project. So those are some of the things that we have in place.

Mr. SURASH. Sir, at the Office of Environmental Management, this is something that our prime contractors definitely must pay attention to. I do not want to sit here and say it is easy, but they do have to pay attention. There are some issues, as Bob was mentioning, with respect to the nuclear quality standards, that need to be dealt with, but this does not seem to be one of the prime drivers for some of the overruns we are seeing, but it is something that requires continual attention due to the nature of the work.

Mr. BOSCO. Sir, and I am in the project management policy business at the Department of Energy, but I can share one concern I think we all have because we have not been in the nuclear construction business for so many years, as we do have people, craftspeople on our jobs and as new commercial nuclear reactors start getting built, dependent on the market, we do have concerns that some of our people that effectively we have trained on our jobs could migrate over and move to some of those projects.

Mr. NUNNELEE. The question is not so much losing these people after you get them trained. You have to be licensed in welding for nuclear projects; right?

Mr. RAINES. Yes, sir. Different certifications. Yes, sir.

Mr. NUNNELEE. The question in the future is are we going to have enough of these people? So it is not losing them; it is trying to get them.

Mr. RAINES. I think in essence we are creating a large part of the industrial base for these kinds of projects. So we were the first out of the ground with many of this work. There were some commercial projects that are being built today, and so we are providing that trained workforce that will be able to go there. I know in Oak Ridge, for example, we are trying to work with the local colleges, the community colleges, to see how can we, in fact, encourage them to have associates' degrees to do this kind of work because the UPF project, once we baseline that job about a year from now, it is a job that will span for 7 to 10 years. And so if we do that, we can

show people that if you will get trained in these skill sets, that there is a job in a local community available for you.

Mr. FRELINGHUYSEN. Will the gentleman yield? So you say it is not a problem, losing people?

Mr. RAINES. I will say that the retention portion right now is not a problem. Training the people initially to get to the standard was more costly than we had anticipated.

Mr. FRELINGHUYSEN. Thank the gentleman for yielding.

Mr. NUNNELEE. Thank you. I yield back, sir.

Mr. FRELINGHUYSEN. Mr. Fleischmann, Oak Ridge has been invoked.

Mr. FLEISCHMANN. Indeed.

Mr. FRELINGHUYSEN. We warmed up the room for your arrival.

Mr. FLEISCHMANN. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. I am very pleased to recognize you.

Mr. FLEISCHMANN. Thank you, sir.

Good morning, gentlemen. I have a few questions. As our chairman has said, I represent the Third District of Tennessee, which includes all of Oak Ridge.

Mr. Raines, there seems to be some question, sir, as to whether or not the UPF construction will be split off from the Y12 Pantex M&O contract. Can you kindly clarify that situation, please, sir?

Mr. RAINES. Sir, I really cannot discuss too much because that is a contract action that is under protest. But what has been reported in the press is that the offeror that we selected was going to do not only the management and operations but was also going to do the construction. So we did award both contract line items to the successful offeror.

Mr. FLEISCHMANN. Thank you. Now, I realize you have the MOX in South Carolina and you have a project I believe out in Idaho. You have got four or five major projects. One of the biggest challenges in meeting the cost estimates for many of these major construction projects seems to be that they are one-of-a-kind facilities. You have never built a UPF before with technical requirements that have never been built. Can you briefly describe some of the technological challenges faced when building these facilities? And then a follow-up question, is there any guidance that you use while preparing to ensure that the equipment and processes are sufficiently mature before you set a baseline?

Mr. RAINES. Yes, sir. Although these are all first of a kind, there are a lot of similarities in things that we can get good cost data on. So, for example, all of the major projects, the ones that Jack is constructing and the ones that we are constructing, are all NQA-1 type projects. They are all HazCat 1 nuclear facilities. They all have to meet specific seismic concerns that we would either work with the Defense Board or the NRC. And so we now have a much better understanding of what it takes to satisfy all of those requirements.

I think more importantly what we have is a basis for work actually being constructed. So it is not just taking numbers out of a book; it is really understanding what is it that our craft can do and what is it that a supplier-base can do? Again, that was one of the reasons why we revised the top-end of the range for the UPF project up based on this experience.

Technology readiness is extremely important. We design the facility based around specific technology. So, for example, for the 9212 portion of UPF there are seven technologies that are new to us. There are technology level ratings that go from 1 to 9. In accordance with our orders, we have to be at a minimum of technology readiness level 6 before we baseline. For those seven technologies, five of those are already at 6 or 7; two are below 6, and we believe that we will have those at 6 in the next several months. And so we will make sure, just as the design needs to be fully matured, that the technology will be matured. That is a lesson learned.

One of the things people have asked us is we want to get started. We want to get started. What our goal is is to finish on schedule. And what we have learned is that if you take the time upfront, you will not get the schedule growth, and in our business, time is, in fact, money. And so we would rather delay the start to make sure that what we are building can be built in accordance with that original plan.

Mr. FLEISCHMANN. So we are talking about not only the 90 percent complete design before you break ground but you are also talking about getting to a technological place where you all feel comfortable?

Mr. RAINES. Yes, sir.

Mr. FLEISCHMANN. Okay. And you do think you can get there on the technology side?

Mr. RAINES. Yes, sir.

Mr. FLEISCHMANN. Okay.

Quick follow-up question. Sequestration will obviously cause difficulties for virtually all DOE programs, and construction is probably going to be impaired as well. How does DOE plan to handle construction projects in this environment? And will the Department prioritize certain projects over others? And what will the Department's policy be for deciding which projects are given priority?

Mr. SURASH. I will go first, sir. For environmental management we have two construction projects—the Waste Treatment Plant and Salt Waste Processing Facility Project. We are analyzing the impacts of sequestration. One issue that has come up is that the Waste Treatment Plant has two control accounts and we may have an imbalance there. And we are looking at a reprogramming action to put the funds in the correct place.

Mr. RAINES. So I cannot speak to the fiscal year 2014 budget, but for the work that we have ongoing today, we took a look at all of the work that we had. And luckily, right now the project that we have ongoing, we do not believe that sequestration will have a very negative impact. As always, what it does is it increases risk because we have contingency on the projects that right now will go to the sequestration. And so if those risks that we have on the project do materialize, then it could have an adverse effect in the future.

Mr. FLEISCHMANN. Thank you, Mr. Chairman. I yield back.

Mr. RAINES. And one also thing, sir. One of my colleagues in the back did want me to make sure that I was absolutely precise on the UPF. So the way that the CLIN was lined up was for the construction management. And so I know sometimes people might, you

know, so even I confuse it. The CLIN was for construction management, and that is what was, in fact, awarded.

Mr. FLEISCHMANN. Thank you.

Mr. FRELINGHUYSEN. Thank you, Mr. Fleischmann.

So is there a baseline in the offing?

Mr. RAINES. We believe that we will baseline UPF approximately one year from now, once we are at 90 percent design and as I mentioned, the technology readiness levels meet the criteria for a credible baseline.

Mr. FRELINGHUYSEN. I just want to make a few general comments about large projects versus small projects. You have noted obviously some success in small projects, but not all small projects have been successful.

Mr. RAINES. That is correct.

Mr. FRELINGHUYSEN. Some have been less than successful. Right?

Mr. RAINES. That is correct.

Mr. FRELINGHUYSEN. The issue here is this enterprise has certain objectives and priorities. And of course, these big projects are enormously expensive. And maybe the small projects can be expendable. That would be unhappy for any installation or laboratory or part of the country. But the big projects are part of our mission here. The nuclear stockpile. That is where the real money is, where the real priority is. You know that all too well.

I just want to touch back into where I know Mr. Raines made some comments about withholding fees. That is a hammer, right?

Mr. RAINES. Yes, sir.

Mr. FRELINGHUYSEN. Have you exercised it? You have that authority. I know you are, to some extent all of you, futurists. You are looking towards the future in a positive way but there are existing contracts. And as complex as they may be, and certainly with the larger projects as they are and they are expensive, there must be some ways to exercise some authority; right? Can you talk a little bit about that? Whether that has been done to you?

Mr. RAINES. Yes, sir.

Mr. FRELINGHUYSEN. Mr. Raines, if you could. And Mr. Surash, what have you done?

Mr. RAINES. I would like to talk about four quick projects that we have held fees on, some of which I think we have mentioned today. The first one is MOX. As we saw that the cost was increasing on MOX, starting in fiscal year 2011, the contractor earned zero percent of their incentive fee in 2011 and 2012. That was a \$30 million fee withhold. Overall, there were some award fee pieces of their work. So when we take incentive fee and award fee—

Mr. FRELINGHUYSEN. Was any money paid out?

Mr. RAINES. Yes. Some money was paid out. So overall, we paid 29 percent of the fee that was available in fiscal year 2011, and 19 percent of the fee in fiscal year 2012. The reason is that there are some things that the contractor is doing exceptionally well. For example, I mentioned the NRC. So one of the things that is very important that we want to incentivize because it lowers the ultimate cost of the project is quality. If we have to do rework it will cost us more money on a cost contract and it will push the schedule.

So we wanted to make sure that we still had incentives for things that were still important to the Department.

On the Uranium Processing Facility, as you are quite aware, we did not deliver the 90 percent design on schedule this year. We paid zero fee for that. So the UPF contractor for the effort on UPF earned less than 10 percent of the available fee this year. This is something that we have not done in the past.

Mr. FRELINGHUYSEN. Why not? Have you had the authority to do it?

Mr. RAINES. I do not know why. I do not know why we have not done it in the past but our contractors are taking notice. And so now they are more focused on understanding what our expectations are. On the NNSA project—

Mr. SIMPSON. Will the gentleman yield?

Mr. FRELINGHUYSEN. Yes, sir.

Mr. SIMPSON. When you say they were paid 10 percent and 90 percent was withheld, is that 90 percent foregone or is it just 90 percent that will be paid later on?

Mr. RAINES. That 90 percent is foregone forever, sir.

Mr. SIMPSON. Okay.

Mr. FRELINGHUYSEN. And just tell me, if you keep the money, what happens to it? Why should it not be returned, reinvested, or maybe returned to the taxpayer?

Mr. RAINES. Yes, sir. Well, because these are cost contracts, what we do is we reinvest that into the overrun. So if the money came off of the project—

Mr. FRELINGHUYSEN. We reinvest into the overrun. What does that actually mean? We are legitimizing something? An overrun means that somebody was involved in poor planning to some extent. Is that—

Mr. RAINES. Yes, sir. Well, I guess the way to explain it is if I said a project was supposed to cost \$100 million and my contractor overran by 5 and I had \$5 million of fee available, I would take the \$5 million of fee back. So I still had \$100 million asset with which to complete the work. And so I delivered the project at the original budget that we submitted in our data sheet. It is just that the contractor did not earn any fee. So that is what I mean when I say reinvest.

Mr. FRELINGHUYSEN. The crux of the matter here is that we have certain people in the driver's seat here at the DOE who are supposed to be managing this remarkable enterprise. And it apparently at times people have not measured up. Obviously, you are in the position—you are saying we are measuring up these days.

Yes, Mr. Surash, jump in.

Mr. SURASH. Thank you, sir.

Mr. FRELINGHUYSEN. Talk about this whole issue of fees here.

Mr. SURASH. Yes, sir. A couple things. First of all, in the Office of Environmental Management, the fee determinations are made by our fee determination officials who are typically our site managers. We have a process that requires a peer review back at headquarters. And that has just been going on for a couple of years. So let me give—

Mr. FRELINGHUYSEN. Headquarters back where? Back here in Washington?

Mr. SURASH. My office, sir.

Mr. FRELINGHUYSEN. Oh, your office.

Mr. SURASH. Yes, sir. And that is not something we were doing three or four years ago.

So let me give you a quick example on the Salt Waste Processing Facility Project. Several years ago when we restructured that contract, we had fee-for-schedule accomplishment and fee-for-cost accomplishment. But we had a capping provision where if the contractor exceeded a certain cost cap, and in this case I think it was about \$1.1 billion, they would forfeit all fee for the entire construction.

Mr. FRELINGHUYSEN. That is a pretty high number, right?

Mr. SURASH. It was within our baseline amount, sir. At that time the project—

Mr. FRELINGHUYSEN. The baseline at that time.

Mr. SURASH. Yes, sir.

Mr. FRELINGHUYSEN. Has the baseline been rejiggered or what?

Mr. SURASH. In 2008. Yes, sir. It was increased.

Mr. FRELINGHUYSEN. Okay.

Mr. SURASH. So this was on the second baseline, sir.

So the project was at \$1.3 billion. The contractor at about \$1.1 billion. The provision we had in our contract was if they were to breach that amount, they would forfeit all fee for the entire construction project.

Mr. FRELINGHUYSEN. Are we talking about a specific project here?

Mr. SURASH. Salt Waste Processing.

Mr. FRELINGHUYSEN. What about other projects? I am interested in where the GAO is coming from. Consistency here. Consistency, inconsistency?

Mr. SURASH. In thinking about our other major contracts, we have the clean-up contractor in Portsmouth, we have reduced their fee due to some safety concerns.

Mr. FRELINGHUYSEN. Is your behavior, is it consistent here?

Mr. SURASH. We are definitely holding our contractors accountable to what they are under contract for. It is very clear what the contract says. And we are doing our best to hold them accountable.

Mr. FRELINGHUYSEN. Well, to Mr. Raines, the GAO had something to say about you, did it not? NNSA for overriding the award of incentive fees to Los Alamos this year and Lawrence Livermore. Was there some issue there?

Mr. RAINES. I believe that their discussion was not about overriding incentive fees. It was about giving an award term. And so we—

Mr. FRELINGHUYSEN. Giving a?

Mr. RAINES. An award term. So the incentive fee and the award fee recommendations were taken. And in fact, were larger than initially proposed, the reductions. And the fee determining official decided that it was still in the best interest of the Department to award the award term.

Mr. FRELINGHUYSEN. Do you want to repeat that again?

Mr. RAINES. The fee determining official—

Mr. FRELINGHUYSEN. Who is the fee determining official? Who is this person?



Mr. RAINES. It was Acting Administrator Miller.

Mr. FRELINGHUYSEN. Okay. Okay. Who has testified before the Committee for the Critical Decisions Leadership. Okay.

Ms. Kaptur.

Ms. KAPTUR. Thank you, Mr. Chairman.

Mr. Surash, you stated in answer, in a dialogue with Congressman Simpson, that one of the reasons for delay was that in the vessels the subcontractor could not do it and there was a two-year delay associated with it and obviously with a two-year delay of cost. All right. How is it possible—that goes back to my question of is the problem scientific? Is the problem engineering? What was the problem there? If we just look at that one little keyhole on why this project has had such overruns, what happened?

Mr. SURASH. Ma'am, I think this concerns the state of the nuclear supply chain in this country. The prime contractor did an adequate job of attempting to find qualified subcontractors to fabricate and deliver the vessels. They awarded a subcontract, and, after a certain amount of time, this contractor was not making sufficient progress so they fired the subcontractor and went out and found a second subcontractor who eventually did a fine quality job.

Ms. KAPTUR. In this country?

Mr. SURASH. Yes, ma'am. I believe in Pennsylvania. But the sum total delay on this project from when the first subcontractor was supposed to deliver to when the vessels eventually arrived, very unfortunately, was two years.

Ms. KAPTUR. Was it that the first contractor could not handle the size of the vessel or the type of metal or composite or whatever it was?

Mr. SURASH. I would say it was inability to do the quality work in the timeframe that we needed it. The second subcontractor—

Ms. KAPTUR. Why did it take the prime contractor two years to figure that out?

Mr. SURASH. It actually took a much shorter time because a lot of this was the fabrication time. But even the second contractor did not deliver to what they signed up to. So the good news is we got high quality vessels that are installed in the building today and everything looks very good. And the cost was okay. But the bad news part of that is even the second subcontractor was not able to provide timely delivery. And what we had to do on that project is essentially build the building around the missing vessels and actually crane them in through the roof. So the prime contractor and the construction manager did the best job they could to make up for this, but it ended up causing quite an increase and a delay.

Ms. KAPTUR. Could I ask each of you from the accounts that you look at, what is the worst project that is in the old category that started before you got there in terms of cost overruns?

Mr. BOSCO. I guess I do not think anyone is going to be surprised by my answer. That would have to be the Waste Treatment Plant. And that causes me the most concern because we still have to wrestle with outstanding technical issues. MOX and Salt Waste, we have figured those out. We have got those technical issues figured out, but WTP, we have got to figure out those technical issues. And then the process is gain acceptance of those technical issues with our external stakeholders to include DNFSB, incorporate those into

new designs, cost those out, establish a new baseline. So I am most concerned with WTP.

Ms. KAPTUR. Is that scientific in nature?

Mr. BOSCO. I think the current problem has some scientific nature because it really gets to fluid mechanics. And so in that regard I think Secretary Chu is taking the exact right position to insert some of our best and brightest in those fields to help figure this technical issue out.

Ms. KAPTUR. What is the total cost overrun at this point?

Mr. BOSCO. I wish I could answer that. I just will not know until we understand the technical issue and then the redesigns that will be required.

Ms. KAPTUR. But based on the original budget submission versus the current budget submission, what is the difference? Just subtract the current from the past.

Mr. BOSCO. Yes. So from my official records the project, and there will be others that will go back even further, it was baselined in 2003 at \$5.7 billion. We are currently with a baseline change at effectively \$12.3 billion, which was baselined in December 2006. The number I am unable to provide at this time is what will it cost. And that is what is still being—

Mr. FRELINGHUYSEN. Will the gentlewoman yield?

Ms. KAPTUR. I will.

Mr. FRELINGHUYSEN. When would we anticipate the number?

Mr. BOSCO. I will defer to my colleagues from EM. They are still putting together, and working with the secretary on the technical issues.

Mr. SURASH. Sir, I cannot project an exact date. We need to let the technical review complete so that we understand and mature the technology and mature the design. We want to follow some of the steps that you have been hearing about because we cannot be trying to construct a facility with the design still changing.

Mr. FRELINGHUYSEN. We did plenty of that before. We do not want to do that again.

Mr. SURASH. Yes, sir. Absolutely.

Mr. FRELINGHUYSEN. But it is in the offings, some sort of a number?

Mr. SURASH. I am not able to give you a projection, sir, at this time, but we want to get the technology resolved.

Mr. FRELINGHUYSEN. Ms. Kaptur.

Ms. KAPTUR. Thank you, Mr. Chairman.

I just wanted to say that is such an extraordinary change from where it started to where it is today and where it might go. Having served on the NASA Subcommittee for many years and understanding the difficulty of an agency, it sounds to me like the cost overrun here or underestimate will equal NASA's annual budget. That is just an extraordinary figure. And I think it would behoove all of us to go back and deconstruct at every point what happened in terms of the estimates. And, you know, Mr. Chairman, I am not a nuclear scientist, but maybe we are trying to do something here we do not know how to do and we are spending a lot of money. If it is a research project, let us call it a research project. But to put product in the ground with these kind of cost overruns, looking at everything else in this budget that we have to cut, having this

open-ended bleeding wound out there that just keeps taking more and more of our allocation in this Subcommittee is very, very troubling to me. I have to be very straightforward and state that.

And I wonder if you could provide for the record—maybe you already have and I just do not have it in my notebook—but for the Waste Treatment Plant, the MOX facility, and the Salt Water Processing, the baseline originally, and then what happened in every year, how much it kept getting kicked up. And could you provide for the record the main contractors on those projects, please?

Mr. BOSCO. We can.

Mr. SURASH. Yes, ma'am. And ma'am, may—

Mr. FRELINGHUYSEN. Jump in.

Mr. SURASH. I just, and we will be providing this for the record, but I just want to say at this time there is also a scope increase between the one baseline that Paul mentioned and the 12.3. So we will provide that for the record. So we are not comparing a plant with the same capacity at the 4, the 5, and the 12.3. There is an increase in what it will be able to accomplish. But we will provide more details for the record, ma'am.

Ms. KAPTUR. Well, at this point I do not even believe it can accomplish what the testimony says it might with that kind of cost overrun. Scientifically, I am not assured. So maybe others are but I am not very confident at this point.

Thank you very much.

Mr. FRELINGHUYSEN. Okay, thank you, Ms. Kaptur.

Mr. Nunnelee, let us get a last question for this round and then we have the next panel. Mr. Nunnelee.

Mr. NUNNELEE. Thank you, Mr. Chairman.

I am just interested in your planning for sequestration, particularly the six months leading up to sequestration. When did you start planning for it? How did you go about making the decisions and what criteria did you use for those decisions?

Mr. SURASH. I will give it the first try.

Sir, the sequestration was pretty mechanical because there was, you know, for us in the Office of Environmental Management we have 32 control accounts. Our budget is across 32 different control accounts, and sequestration, as you are aware, was a mechanical reduction in each of those control accounts. So we were obviously looking at those control accounts and what the impacts would be. And for instance, for the Waste Treatment Plant there are two control accounts involved there. We know we have an imbalance and that will require a reprogramming. And we are going to be bringing that forward, sir.

Mr. RAINES. So for us in the NNSA, we saw that sequestration might occur. Every month I review how our projects are performing. Do we have contingencies left on those projects and are they underrunning or do we need all the money that is available? So we put together a portfolio of all of our active projects and saw where we might be able to have an asset. And I checked with the CFO staff to see if the anomaly that we had in the continuing resolution would allow us to shift money from projects that were underrunning to projects that might take a cut that would cause us to increase the cost. And so that was the planning effort that we took into account, sir.

Mr. BOSCO. Sir, and I had no direct play as an oversight function in the Department.

Mr. NUNNELEE. Thank you.

Mr. FRELINGHUYSEN. Thank you, Mr. Nunnelee. Gentlemen, thank you very much for your testimony this morning. I appreciate your work and we encourage you to work even harder to achieve your objectives. We appreciate it. Lots of milestones to reach here. We appreciate your work. Thanks.

Mr. BOSCO. Thank you.

Mr. RAINES. Thank you.

Mr. SURASH. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. Well, gentlemen, good morning.

Mr. TRIMBLE. Good morning.

Mr. FRELINGHUYSEN. Take your seats. I was watching you very closely to see you shifting in your seats as the other panel responded to our questions. I know you wanted to lean over and volunteer some of your own perspectives and now you are going to have a chance to do that.

Let me briefly reintroduce our guests and thank you all for coming. Mr. David Trimble, director of Natural Resources and Environment for the Government Accountability Office. Welcome. Nice to see you again.

Mr. TRIMBLE. Thank you.

Mr. FRELINGHUYSEN. Mr. Mike Ferguson, chief cost engineering, Huntington District, U.S. Army Corps of Engineers. Mr. William Eckroade, Principal Deputy Chief, Office of Health, Safety, and Security is where? He must be on some sort of a security assignment we are unaware of here. I do not know. It has fallen by the wayside.

Mr. Trimble, I guess you are first out of the box. Thank you very much for being here.

Mr. TRIMBLE. Mr. Chairman, Ranking Member Kaptur, and members of the Subcommittee. Thank you for the opportunity to speak with you today.

Mr. FRELINGHUYSEN. Move that mic up a little closer. Thanks.

Mr. TRIMBLE. My testimony will focus on DOE's efforts to improve contract and project management and preliminary observations from our ongoing review of NNSA's Plutonium Disposition Program, including the ongoing construction of MOX and its sister facility, the Waste Solidification Building (WSB).

Since 2009, DOE has taken a number of steps to improve its management of major projects, including: updating its program and project management policies and guidance; requiring peer reviews and independent cost estimates for projects over \$100 million, and requiring design work for NNSA projects to be 90 percent complete before construction.

In 2012, we issued two reports examining EM and NNSA non-major projects, those costing less than \$750 million. Our work found evidence that DOE's reform efforts were beginning to improve the management of non-major construction projects. In 2013, noting these improvements and the continued commitment of DOE's senior leadership, we narrowed the focus of our high-risk designation to major contracts and projects.

While DOE's actions to improve project management are promising, their impact on meeting cost and schedule targets for major projects is not yet clear. All of DOE's ongoing major projects began before these recent reforms were instituted and these projects continue to experience significant cost increases and schedule delays. WTP has tripled in cost to \$13.4 billion with a decade added to its schedule. UPF costs have increased sevenfold to \$6.5 billion with 11 years added to the schedule. CMR costs have increased nearly sixfold up to \$5.8 billion with a total delay counting the deferral announced last year up to 12 years.

Our ongoing review of MOX and WSB has found similar problems, and highlights the need for continued efforts by DOE to improve contract and project management. The contractor for the MOX facility currently estimates the cost will increase from \$4.9 to \$7.7 billion with a three-year delay in the start of operations. With regard to WSB, DOE recently approved a revised project baseline to increase the cost from \$345 million to \$414 million with a two-year delay in the start of operations.

I should note that WSB is a non-major project and illustrates why our 2013 high-risk update stated that though we have shifted our focus to major projects, we will continue to monitor non-major projects to ensure that progress is sustained. As this Committee requested, we are currently examining what factors drove these cost increases. Preliminary observations from our work include the following:

One of the primary reasons for the cost increase at MOX is reportedly due to inadequately designed critical system components, such as glove boxes used for handling plutonium. The contract baseline for MOX predates NNSA's 2012 guidance to set baselines only after design work is 90 percent complete. As part of our ongoing work, we are evaluating the potential impact this guidance might have had on mitigating these cost increases and scheduled delays.

According to NNSA, the MOX project misjudged the ability of the industry to deliver nuclear-quality components to meet the project schedule. Under the terms of the MOX contract, the contractor was required to submit market reports to identify whether the availability of labor, materials, and equipment might affect this cost or schedule. As part of our ongoing work, we plan to examine the extent to which the contractor or DOE assessed market conditions.

Our ongoing review will also examine the cost and schedule implications of the decision to expand the scope of the contract to include capability previously planned for the canceled pit Disassembly and Conversion Facility.

In 2011 and 2012, NNSA peer reviews of MOX and WSB identified concerns regarding installation rates for equipment and recommended that realistic installation rates be included in the cost estimate. We are examining the extent to which any actions were taken in response to these reviews.

And finally, NNSA developed the lifecycle cost estimate for the entire Plutonium Disposition Program, but it has never been reviewed by an outside entity. We plan to examine this estimate and the steps NNSA is taking to validate it.

In closing, let me note that the recurring nature of these problems resembles DOE's longstanding difficulty in sustaining security reforms and integrating security as part of its core mission. And like security, the culture of the agency seems to play a role.

So in looking at why more progress has not been made, it is important to focus on both actions taken and actions not taken that seem to undermine the agency's efforts to reshape its culture. For example, DOE rescinded its cost estimating policy in the 1990s and it has never been replaced. In 2010, DOE accepted the importance of independent cost estimates but then required them for only one of three critical decision points. Each of these decisions was both a product of the agency's culture but also an event which helped to sustain that same culture. To change the current equation, DOE must ensure that all, not just some of its decisions, send a clear message on the importance of its reform efforts.

Thank you, and I would be happy to answer any questions.

[The information follows:]

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United States Government Accountability Office

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GAO

Testimony

Before the Subcommittee on Energy and  
Water Development, and Related Agencies  
Committee on Appropriations, House of  
Representatives

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DEPARTMENT OF  
ENERGY

Concerns with Major  
Construction Projects at the  
Office of Environmental  
Management and NNSA

Statement of David C. Trimble, Director  
Natural Resources and Environment



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GAO-13-484T



Highlights of GAO-13-484T, a testimony before the Subcommittee on Energy and Water Development, and Related Agencies, Committee on Appropriations, House of Representatives

### Why GAO Did This Study

DOE relies primarily on contractors to carry out its diverse missions and operate its laboratories and other facilities, with about 90 percent of its annual budget spent on contracts and capital asset projects. Since 1990, GAO has reported that DOE has suffered from substantial and continual weaknesses in effectively overseeing contractors and managing large, expensive, and technically complex projects. As of February 2013, EM and NNSA remained on GAO's list of areas at high risk of fraud, waste, abuse, and mismanagement for major contract and project management.

This testimony, which is primarily based on GAO reports issued from March 2009 to December 2012, focuses on (1) prior GAO findings on DOE major projects and the impact of recent DOE steps to address project management weaknesses and (2) preliminary observations from GAO's ongoing work on the reasons behind the planned increase in the performance baseline—a project's cost, schedule, and scope—for two projects being constructed as part of NNSA's Plutonium Disposition Program—the MOX facility and the Waste Solidification Building.

GAO is making no new recommendations. DOE and NNSA continue to act on the numerous recommendations GAO has made to improve management of the nuclear security enterprise. GAO will continue to monitor DOE's and NNSA's implementation of these recommendations.

View GAO-13-484T. For more information, contact David C. Trimble at (202) 512-3841 or [dtrimble@gao.gov](mailto:dtrimble@gao.gov).

March 2013

## DEPARTMENT OF ENERGY

### Concerns with Major Construction Projects at the Office of Environmental Management and NNSA

#### What GAO Found

In response to GAO reports over the past few years on management weaknesses in major projects (i.e., those costing \$750 million or more), the Department of Energy (DOE) has undertaken a number of reforms since March 2009, including those overseen by the Office of Environmental Management (EM) and the National Nuclear Security Administration (NNSA). For example, DOE has updated program and project management policies and guidance in an effort to improve the reliability of project cost estimates, better assess project risks, and better ensure project reviews that are timely and useful, and that identify problems early. In addition to actions taken to improve project management, in its 2012 work, GAO has noted DOE's progress in managing the cost and schedule of nonmajor projects—those costing less than \$750 million. DOE's actions to improve project management are promising, but their impact on meeting cost and schedule targets is not yet clear. Because all ongoing major projects have been in construction for several years, neither EM nor NNSA has a major project that can demonstrate the impact of DOE's recent reforms.

GAO's ongoing review of NNSA's Plutonium Disposition Program, including examining recent problems with the ongoing construction of the Mixed Oxide (MOX) Fuel Fabrication Facility and the Waste Solidification Building at the Savannah River Site in South Carolina, has resulted in some preliminary observations that highlight the need for continued efforts by DOE to improve contract and project management. DOE is currently forecasting an increase in the total project cost for the MOX facility from \$4.9 billion to \$7.7 billion and a delay in the start of operations from October 2016 to November 2019. Specifically, DOE is evaluating a project baseline change proposal prepared by NNSA's contractor for the MOX facility—a major project. The cost increase and schedule delay will not be known until DOE completes its review of the contractor's proposal and DOE's project oversight office completes an independent cost estimate of the project. With regard to the Waste Solidification Building—a nonmajor project—DOE approved a revised performance baseline in December 2012 to increase the cost from the initial estimate of \$344.5 million to \$414.1 million and a delay in the start of operations from September 2013 to August 2015. GAO's ongoing work is focused on several areas, including the following:

- critical system components' design adequacy,
- understanding the nuclear supplier base,
- changes in project scope,
- the effectiveness of project reviews; and
- lifecycle cost estimates for the Plutonium Disposition Program.

GAO plans to report on this ongoing work later this year.





United States Government Accountability Office  
Washington, DC 20548

Chairman Frelinghuysen, Ranking Member Kaptur, and Members of the Subcommittee:

Thank you for the opportunity to discuss our work on contract and project management at the Department of Energy (DOE). DOE, the largest civilian contracting agency in the federal government, relies primarily on contractors to carry out its diverse missions and operate its laboratories and other facilities, with about 90 percent of its annual budget spent on contracts and large capital asset projects. Since 1990, we have reported that DOE has suffered from substantial and continual weaknesses in effectively overseeing contractors and managing large, expensive, and technically complex projects. For example, in November 1996, we reported on the status of DOE's major projects and found that, as of June 1996, most of the completed projects and at least half of the 34 ongoing projects were experiencing cost overruns and/or schedule slippages.<sup>1</sup> We also reported that some ongoing projects were never finished and that three completed projects had not been used for their intended purposes at the time of our review.

In the 1990s, DOE began implementing a series of reforms that included efforts to strengthen project management practices, such as planning, organizing, and tracking project activities, costs, and schedules; training to ensure that federal project managers had the required expertise to manage projects; increasing emphasis on independent reviews; and strengthening project reporting and oversight. Furthermore, as we testified before this Subcommittee in March 2009,<sup>2</sup> DOE undertook additional actions to improve contract and project management, including a department-wide root-cause analysis and subsequent corrective action plan to address identified weaknesses. We noted in our 2009 testimony that DOE had added nearly \$14 billion and 45 years to its initial cost and schedule estimates of then ongoing construction projects, and added an additional \$25 billion to \$42 billion and an additional 68 to 111 years to initial cost and schedule estimates of ongoing environmental cleanup

<sup>1</sup>GAO, *Department of Energy: Opportunity to Improve Management of Major System Acquisitions*, GAO/RCED-97-17 (Washington, D.C.: Nov. 26, 1996).

<sup>2</sup>GAO, *Department of Energy: Contract and Project Management Concerns at the National Nuclear Security Administration and Office of Environmental Management*, GAO-09-406T (Washington, D.C.: Mar. 4, 2009).

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projects. We noted that the cost increases and schedule delays that occurred for most of these projects were attributable to an inconsistent application of project management tools and techniques on the part of both DOE and its contractors, including inadequate systems for measuring contractor performance, approval of construction activities before final designs were sufficiently complete, ineffective project reviews, and ineffective development and integration of the technologies used in these projects.

While DOE has taken many steps to improve contract and project management, the Office of Environmental Management (EM)—one of DOE's largest program offices—and the National Nuclear Security Administration (NNSA)—a separately organized agency within DOE—continue to experience significant problems completing major projects on time and on budget. My testimony today is based primarily on reports we issued from March 2009 to December 2012 that assess DOE management of various major construction projects. Specifically, I will focus my testimony on (1) prior GAO findings on DOE major projects and the impact of recent DOE steps to address project management weaknesses and (2) preliminary observations from our ongoing work for this Subcommittee on the reasons behind the planned increase in the performance baseline—a project's cost, schedule, and scope—for two projects being constructed as part of NNSA's Plutonium Disposition Program—the Mixed Oxide (MOX) Fuel Fabrication Facility and the Waste Solidification Building at the Savannah River Site in South Carolina.<sup>3</sup> Detailed information on our scope and methodology for our prior work can be found in these reports.

To develop our preliminary observations, we reviewed documents related to the performance baseline changes for both the MOX facility and Waste Solidification Building, interviewed NNSA and contractor officials, and visited the Savannah River Site to meet with project officials and observe the construction progress for both facilities. We are conducting our ongoing work in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings

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<sup>3</sup>Mixed oxide fuel is a mix of plutonium and uranium.

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and conclusions based on our audit objectives. We obtained NNSA's views on new information in our testimony concerning our ongoing work on the MOX facility and Waste Solidification Building.

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## Background

To manage major construction projects, DOE project directors in EM and NNSA are required to follow specific DOE directives, policies, and guidance for contract and project management. Among these is DOE Order 413.3B, which provides direction for planning and executing projects. To oversee projects and approve critical decisions, DOE conducts its own reviews, often with the help of independent technical experts. For example, for large projects (i.e., projects with a total cost of greater than \$100 million), DOE's Office of Acquisition and Project Management is required to validate the accuracy and completeness of a project's performance baseline as part of each important project step.

NNSA's largest ongoing construction project involves the disposition of surplus U.S. weapons-grade plutonium as part of the Plutonium Disposition Program. Under an agreement signed in 2000, the United States and Russia will each dispose of at least 34 metric tons of surplus weapons-grade plutonium by irradiating it as MOX fuel in nuclear reactors. A key part of the U.S. program includes the construction of two nuclear facilities at DOE's Savannah River Site: a MOX facility that will produce MOX fuel for nuclear reactors and a Waste Solidification Building to dispose of the liquid waste from the MOX facility. A third nuclear facility had been planned for the Savannah River Site to disassemble nuclear weapon pits (i.e., the spherical central core of a nuclear weapon that is compressed with high explosives to create a nuclear explosion)—the Pit Disassembly and Conversion Facility—and to provide plutonium feedstock for fuel fabrication. NNSA canceled the facility in January 2012 and, instead, decided to meet its feedstock requirements through existing facilities at DOE's Los Alamos National Laboratory and the Savannah River Site, including potentially the MOX facility. NNSA spent approximately \$730 million on the design of this facility prior to its cancellation.

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### DOE Has Continued to Implement Reforms, but Their Impact Is Not Yet Clear

A basic tenet of effective project management is the ability to complete projects on time and within budget. DOE has continued to experience management weaknesses in major projects (i.e., those costing \$750 million or more). In response, since March 2009, DOE has undertaken a number of new reforms to improve its management of major projects, including those overseen by EM and NNSA. For example, DOE has updated program and project management policies and guidance in an effort to improve the reliability of project cost estimates, better assess project risks, and better ensure project reviews that are timely and useful and that identify problems early. Further, in November 2010, DOE took steps to enhance project management and oversight by requiring peer reviews and independent cost estimates for projects with values of more than \$100 million. NNSA has also taken actions to improve the management of projects that it oversees. For example, in August 2012, the NNSA issued guidance calling for design work to be 90 percent complete before construction can begin to minimize design changes and associated cost increases and schedule delays.

Our 2012 work examining DOE's management of nonmajor projects—those costing less than \$750 million—indicates that DOE's reform efforts have helped in managing the department's cost and schedule targets. In particular, in December 2012, we reported that EM and NNSA were making some progress in managing some of the 71 nonmajor projects that were completed or ongoing for fiscal years 2008 to 2012 and that had a total estimated cost of approximately \$10.1 billion.<sup>4</sup> For example, we identified some nonmajor projects that used sound project management practices, such as the application of effective acquisition strategies, to help ensure the successful completion of these projects. This was consistent with what we found in our October 2012 report on EM's cleanup projects funded by the American Recovery and Reinvestment Act of 2009.<sup>5</sup> Of the completed projects we examined, 92 percent met the performance standard of completing project work scope without exceeding the cost target by more than 10 percent, according to EM data. In recognition of these improvements in the management of nonmajor

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<sup>4</sup>GAO, *Department of Energy: Information Needed to Determine If Nonmajor Projects Meet Performance Targets*, GAO-13-129 (Washington, D.C.: Dec. 19, 2012).

<sup>5</sup>GAO, *Recovery Act: Most DOE Cleanup Projects Are Complete, but Project Management Guidance Could Be Strengthened* GAO-13-23 (Washington, D.C.: Oct. 15, 2012).

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projects, we narrowed the focus of the designation of EM and NNSA on our 2013 high-risk list to major contracts and projects at EM and NNSA<sup>6</sup>.

DOE's actions to improve project management are promising, but their impact on meeting cost and schedule targets is not yet clear. Because all ongoing major projects have been in construction for several years, neither EM nor NNSA has a major project that can demonstrate the impact of DOE's recent reforms. As we have reported in the past few years, ongoing major projects continue to experience significant cost increases and schedule delays as shown in the following examples:

- In December 2012, we reported that the estimated cost to construct the Waste Treatment and Immobilization Plant in Hanford, Washington, had tripled to \$12.3 billion since its inception in 2000 and that the scheduled completion date had slipped by nearly a decade to 2019.<sup>7</sup> Moreover, we found that DOE's incentives and management controls were inadequate for ensuring effective project management, and that DOE had in some instances prematurely rewarded the contractor for resolving technical issues and completing work.
- In March 2012, we reported that NNSA's project to design and construct the Chemistry and Metallurgy Research Replacement Nuclear Facility—a new plutonium facility at NNSA's Los Alamos National Laboratory—was expected to cost between \$3.7 billion to \$5.8 billion—nearly a six-fold increase from the initial estimate.<sup>8</sup> In February 2012, NNSA deferred construction of the facility by at least an additional 5 years, bringing the total delay to between 8 and 12 years from NNSA's initial plan. A number of major problems contributed to this increase, including infrastructure-related design changes.

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<sup>6</sup>We update our list of areas at high risk of fraud, waste, abuse, and mismanagement every 2 years. GAO, *High-Risk Series: An Update*, GAO-13-283 (Washington, D.C.: February 2013).

<sup>7</sup>GAO, *Hanford Waste Treatment Plant: DOE Needs to Take Action to Resolve Technical and Management Challenges*, GAO-13-38 (Washington D.C.: Dec. 19, 2012).

<sup>8</sup>GAO, *Modernizing the Nuclear Security Enterprise: New Plutonium Research Facility at Los Alamos May Not Meet All Mission Needs*, GAO-12-337 (Washington, D.C.: Mar. 26, 2012).

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- In November 2010, we reported that NNSA's plans to construct a modern Uranium Processing Facility at its Y-12 National Security Complex in Oak Ridge, Tennessee, had experienced significant cost increases.<sup>9</sup> More recently, in September 2011, NNSA estimated that the facility would cost from \$4.2 billion to \$6.5 billion to construct—a nearly seven-fold cost increase from the original estimate. In addition, NNSA has delayed the expected completion date by 11 years, to 2023. In the November 2010 report, as well as in a January 2010 report,<sup>10</sup> we found a number of major problems that contributed to this increase, including preparation of a cost estimate in 2007 that did not meet all cost estimating best practices. Also, 6 of 10 technologies to be used in the facility were not sufficiently mature, which could lead to cost and schedule delays if the technologies do not perform as intended.

In regard to nonmajor projects, while we reported in December 2012 on progress by EM and NNSA in managing nonmajor projects, we also found that of the 71 nonmajor projects that EM and NNSA completed or had under way from fiscal years 2008 to 2012, 23 projects did not meet or were not expected to meet one or more of their three performance targets for scope, cost, and completion date.<sup>11</sup> We also noted that, for 27 projects, many had insufficiently documented performance targets for scope, cost, or completion date, which prevented us from determining whether they met their performance targets. As we noted in our February 2013 high-risk report, while we have shifted our focus to major contracts and projects, we will continue to monitor the performance of these nonmajor projects.

In these reports and others, we have made recommendations calling on DOE to ensure that project management requirements are consistently followed, to improve oversight of contractors, and to strengthen accountability, among others. DOE has generally agreed with these recommendations and has taken action to address many of them. We will

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<sup>9</sup>GAO, *Nuclear Weapons: National Nuclear Security Administration's Plans for Its Uranium Processing Facility Should Better Reflect Funding Estimates and Technology Readiness*, GAO-11-103 (Washington, D.C.: Nov. 19, 2010).

<sup>10</sup>GAO, *Actions Needed to Develop High-Quality Cost Estimates for Construction and Environmental Cleanup Projects*, GAO-10-199 (Washington, D.C.: Jan. 14, 2010).

<sup>11</sup>GAO-13-129.

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continue to monitor DOE's project management and its implementation of their actions to resolve project management weaknesses.

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**GAO's Ongoing  
Review of NNSA's  
Plutonium Disposition  
Program Highlights  
the Need for  
Continued Efforts to  
Address Project  
Management  
Weaknesses**

Our ongoing review of NNSA's Plutonium Disposition Program, including examining recent problems with the ongoing construction of the MOX facility—a major project—and the Waste Solidification Building—a nonmajor project—has resulted in some preliminary observations that highlight the need for continued efforts by DOE to improve contract and project management. DOE is currently forecasting an increase in the total project cost for the MOX facility from \$4.9 billion to \$7.7 billion and a delay in the start of operations from October 2016 to November 2019. Specifically, DOE is evaluating a project baseline change proposal prepared by NNSA's contractor for the MOX facility.<sup>12</sup> The cost increase and schedule delay will not be known until DOE completes its review of the contractor's proposal and DOE's project oversight office completes an independent cost estimate. DOE currently plans to complete its review and approve a new project baseline by September 2013. With regard to the Waste Solidification Building, DOE approved in December 2012 a revised performance baseline to increase the cost from the initial estimate of \$344.5 million to \$414.1 million and a delay in the start of operations from September 2013 to August 2015.

Our ongoing work is focused on several areas, including the following:

- *Critical system components' design adequacy.* According to NNSA officials and the contractor for the MOX facility, one of the primary reasons for the proposed cost increase and schedule delay is due to inadequately designed critical system components, such as the gloveboxes used in the facility for handling plutonium and the infrastructure needed to support these gloveboxes. According to these officials, although the design of the facility is based on a similar facility in France, the cost of adapting the French design to the design needs of this project was not well understood when the project was approved for construction. The performance baseline for the MOX facility was also set several years before NNSA issued guidance in 2012 to set cost and schedule baselines only after design work is 90 percent

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<sup>12</sup>A project's baseline change proposal provides a complete description of a proposed change to an approved performance baseline, including the resulting impacts on the project's cost, schedule, and scope.

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complete. As part of our ongoing work, we are evaluating whether such guidance would have been useful for NNSA to apply to the MOX facility, as well as the potential impact this guidance might have had on mitigating cost increases and schedule delays.

- *Understanding the nuclear supplier base.* According to NNSA officials and the contractor for the MOX facility, another primary reason for the proposed cost increase and schedule delay is not adequately understanding the ability of the nuclear industry to fabricate and deliver nuclear-quality components to meet the project schedule. Under the terms of the MOX facility contract, the contractor was required to submit, beginning at the completion of preliminary design, semiannual reports regarding the condition of the construction and equipment markets and identify factors, such as availability of labor, materials, and equipment that may affect the cost or schedule for completing the MOX facility. As part of our ongoing work, we plan to review these reports to understand the extent to which the contractor had assessed market conditions.
- *Changes in project scope.* Our ongoing review of the MOX facility includes examining NNSA's direction to its contractor to add to the scope of the construction contract to include capability that NNSA had planned for the cancelled Pit Disassembly and Conversion Facility. As part of our ongoing work, we will examine the extent to which this change in scope affects the cost and schedule of the project and the extent to which this change is consistent with a December 2012 memo from the Deputy Secretary of Energy that emphasizes the importance of improving upfront planning, including changes in scope, as well as defining contract requirements prior to issuing a solicitation.
- *Effectiveness of project reviews.* NNSA project reviews of the MOX facility and the Waste Solidification Building have identified challenges to meeting the facilities' performance baselines and made related recommendations. For example, 2011 and 2012 peer review reports of the MOX facility identified concerns regarding installation rates for equipment and recommended that realistic installation rates be included in the cost estimate. However, the NNSA contractor's 2012 baseline change proposal ultimately cited installation rates as one of the drivers of the proposed cost increase. As part of our ongoing work, we are continuing to gather information on what actions NNSA and its contractor took when the 2011 peer review first raised the concern and the extent to which any actions were taken in response to the review. We are also continuing to gather information on project reviews of the Waste Solidification Building, to determine how



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responsive program officials were to the findings and recommendations of these reviews.

- *Life-cycle cost estimate for the Plutonium Disposition Program.* In addition to setting the cost and schedule performance baselines of the MOX facility and Waste Solidification Building, NNSA has developed a life-cycle cost estimate for the overall effort of the Plutonium Disposition Program to dispose of at least 34 metric tons of surplus weapons-grade plutonium. NNSA officials told us that there has never been a review of this life-cycle estimate by an outside entity but that they are conducting an independent assessment of portions of the life-cycle cost estimate, including the operating cost of the MOX facility. As part of our ongoing work, we are reviewing NNSA's preliminary life-cycle cost estimate and the steps NNSA is taking to validate this cost estimate.

We plan to report on this ongoing work later this year.

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Chairman Frelinghuysen, Ranking Member Kaptur, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

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## GAO Contact and Staff Acknowledgments

If you or your staff members have any questions about this testimony, please contact me at (202) 512-3841 or [trimbled@gao.gov](mailto:trimbled@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this testimony. GAO staff who made key contributions to this testimony are Dan Feehan and Kiki Theodoropoulos, Assistant Directors; and Joseph Cook, and Cristian Ion.



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Mr. FRELINGHUYSEN. Thank you, Mr. Trimble.

Mr. Ferguson, good morning. Thank you for being here.

Mr. FERGUSON. Mr. Chairman and distinguished members of the Subcommittee, I am honored to be here testifying before the Subcommittee today on behalf of the U.S. Army Corps of Engineers regarding interagency support provided to the Department of Energy.

My name is Mike Ferguson. I am chief of the Cost and Technical Support Branch in the Huntington District. Also with me is James Dalton, the chief of the Engineering and Construction Division at Corps Headquarters.

The Corps has historically provided cost engineering support to DOE through interagency agreements. Such support includes independent cost estimates, schedules, risk analysis, cost estimate reviews, assessments, validations, and project controls. Key interagency support efforts that the Corps has provided to EM are the Best-in-Class Project and Contract Management Initiative, the Project Management Partnership, and detailed staffing plan for the four EM capital construction projects. Support for NNSA includes independent cost estimate for the Uranium Process Facility Project, and current support for APM includes independent cost estimate development for the MOX Oxide Fuel Fabrication Facility and the Salt Waste Processing Facility Project.

The Y-12 Project Management Team Site Assessment Office requested the Corps of Engineers prepare an independent cost estimate for the Uranium Process Facility in November 2009. The purpose was to assist the Uranium Process Facility's federal management team to determine the reasonableness of the management and operating M&O contractor's cost estimate schedule for the project. The Uranium Process independent cost estimate results were \$7.386 billion and a completion date of March 2026. In the fall of 2010, the Corps performed a reconciliation of our estimate to the M&O contractor's estimate for the UPF project as requested by NNSA in order to understand where the two differed and why. The variation was approximately 27 percent and was driven by differences in estimating methodology, assumptions, and approach.

In February 2011, the Corps updated the estimate per the findings of the reconciliation where it deemed appropriate. The updated estimate was then fit to a constrained funding profile provided by DOE in August of 2011, which resulted in a total cost of \$10.746 billion and a project completion in April of 2035 at the 85 percent confidence level.

In April 2012, APM tasked the Corps to develop a rough order of magnitude estimate for the accelerated construction of the Uranium Process Facility Project to support DOE's CD-1 reaffirmation process. The Corps updated the revised uranium process base estimate from the February 2011 for the 9212 building capabilities deferred for a total cost of \$5.581 billion and a completion in May of 2027.

In February of 2007, the EM requested interagency support for the Corps of Engineers aimed at developing Best-in-Class project and contract management capabilities for all EM sites. EM developed a five-phase approach to accomplish this goal with support from the Corps. Phase 2 of this assessment of 16 EM sites was performed in 2007 and evaluated the strengths and weaknesses in 12

key project management capabilities and three contract management benchmarks.

In October 2009, the Corps and EM transitioned from the Initiative into the Project Management Partnership. Under the Project Management Partnership, the Corps has continued to support EM. Per EM's request, the Corps has provided in-house construction and project management expertise and awarded two engineering and construction management AE support contracts.

Working under the partnership with EM in May 2010, the Corps was requested to develop results-driven, activity-based detailed staffing estimate for four capital construction projects. These estimates specifically function position types, composition, and number of staff required for the management and oversight of the following four EM projects: the Waste Treatment Plant at Hanford, Washington; Salt Waste Process Facility at Aiken, South Carolina; Uranium-233 Downblend Project in Oak Ridge, Tennessee; and the Eastern Tennessee Technology Park in Oak Ridge, Tennessee.

The results of this detailed staffing estimate for these projects were developed to be reasonable, traceable, credible, defensible, and support DOE-EM Human Capital Management Plan.

In closing, I would like to thank our partners and the Department of Energy for requesting and utilizing interagency support from the Corps. The Corps appreciates the opportunity to serve the Department of Energy in support of the ongoing mission.

Thank you, Mr. Chairman, and members of the Subcommittee. That concludes my statement. I will be happy to answer any questions.

[The information follows:]

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**DEPARTMENT OF THE ARMY**

**COMPLETE STATEMENT**

**OF**

**MIKE FERGUSON**

**CHIEF, COST AND TECHNICAL BRANCH/ENGINEERING DIVISION**

**U.S. ARMY CORPS OF ENGINEERS, HUNTINGTON DISTRICT**

**BEFORE**

**THE COMMITTEE ON APPROPRIATIONS  
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT**

**UNITED STATES HOUSE OF REPRESENTATIVES**

**ON**

**MAJOR CONSTRUCTION PROJECTS OF  
THE DEPARTMENT OF ENERGY**

**MARCH 20, 2013**

Mr. Chairman and distinguished members of the Subcommittee, I am honored to be testifying before your subcommittee today on behalf of the U.S. Army Corps of Engineers (USACE), on Interagency Support provided to the Department of Energy's Office of Environmental Management (EM), National Nuclear Security Administration (NNSA), and Office of Acquisition & Project Management (APM). My name is Mike Ferguson, and I am the Chief, of Cost & Technical Support Branch in the Huntington District.

#### **INTERAGENCY SUPPORT PROVIDED TO DOE-EM & DOE-NNSA**

USACE has historically provided cost engineering Interagency Support to DOE-EM, DOE-NNSA, & DOE-APM via Interagency Agreements and associated Memorandums of Understanding (MOU's) between the agencies. The general types of Interagency Support provided include the following:

- Independent Cost Estimates (ICEs), Schedules, and Cost & Schedule Risk Analyses (CSRAs)
- Cost Estimate Reviews, Assessments, and Validations
- Project Controls support (Earned Value Management System Tracking & Review)

Key interagency cost engineering support efforts that USACE has provided to DOE include the following:

#### **for DOE-EM**

- Best-in-Class Project & Contract Management Initiative (BICPM)
- Project Management Partnership (PMP)
- Detailed Staffing Estimates for 4 DOE-EM Capital Construction Projects (WTP, SWPF, U-233, and ETTP)

#### **for DOE-NNSA**

- ICE for the Uranium Processing Facility (UPF) project

#### **for DOE-APM**

- ICE for the DOE-NNSA's Mixed Oxide Fuel Fabrication Facility (MFFF) - currently in-progress
- ICE for the DOE-EM's Salt Waste Processing Facility (SWPF) project currently in-progress

#### **DOE-NNSA URANIUM PROCESSING FACILITY INDEPENDENT COST ESTIMATE (2009-2012)**

DOE-NNSA's Y-12 Site Office (YSO) requested that USACE Huntington District prepare an Independent Cost Estimate (ICE) for the Uranium Processing Facility (UPF) in November 2009. The purpose of the ICE was to assist the UPF federal management team in determining the reasonableness of the management and operating (M&O) contractor's cost estimate and schedule for the project. USACE Huntington District fielded a diverse and experienced team of USACE Federal and AE Contractor cost

engineers, schedulers, risk analysts, and nuclear construction subject matter experts to manage and develop the ICE in late March 2010. The UPF project was approximately 40% design complete at the time of ICE development. This 40% design was the scoping basis of ICE development. The USACE ICE team worked on-site at the DOE-NNSA UPF project office in Oak Ridge, Tennessee for five months to develop the initial ICE. The USACE ICE team completed the development of a detailed cost estimate, project schedule, and risk analysis in September 2010. The UPF ICE results were as follows:

<b>COST ELEMENT</b>	<b>\$ Amount (in Billions)</b>
Base Estimate	\$4.241
Contingency (85% Confidence Level)	\$1.578
<i>Contingency Percent</i>	37.2%
Escalation (4%)	\$1.350
Actual Cost to Date	\$0.217
<b>TOTAL PROJECT COST</b>	<b>\$7.386</b>
Note: USACE ICE assumed FY11 funding of \$115 million and all out-years were Unconstrained Funding case	
<b>SCHEDULED COMPLETION</b>	<b>January 2023</b>
<b>SCHEDULED COMPLETION w/CONTINGENCY</b>	<b>March 2026</b>

In the Fall of 2010, The USACE ICE team then performed a Reconciliation of its ICE to the M&O Contractor's cost estimate for the UPF project as requested by the DOE-NNSA in order to understand where the two differed and why. The point estimates differed as follows:

<b>PROJECT</b>	<b>USACE ICE</b>	<b>M&amp;O Estimate</b>	<b>Cost Variance (\$)</b>	<b>Cost Variance (%)</b>
UPF Base Estimate	\$4,241,383,290	\$3,107,390,130	\$1,133,993,160	26.74%

The greatest variance was in the out year scope for Planning & Readiness. Some key reasons for cost variances included the following:

- Different cost estimating methodologies yielded different results
  - USACE ICE used bottoms-up detailed estimating methodologies
  - M&O Estimate used historical unit costs
  - USACE used task-based crews for Planning & Readiness
  - M&O used level-of-effort crews annually for Planning & Readiness



- Different scope assumptions
  - Planning & Readiness (startup, training, testing, commissioning) assumptions
    - USACE included project costs for both capability & capacity
    - M&O included project costs for capability only
    - USACE included some labor categories in crews which were covered in overhead (double-counting, later adjusted in final ICE)
    - USACE estimated double shift operation
    - M&O estimated single shift operation
- Work item misplaced or omissions within the Work Breakdown Structure (WBS) accounted for some smaller variances

The USACE ICE for construction of the UPF project's foundation, superstructure, glove boxes, equipment, and utilities was only 7% higher than the M&O's for the point estimate.

In February 2011, the USACE ICE team updated the ICE per the findings of reconciliation where it deemed appropriate. The updated ICE was then fit to the constrained funding profile provided by DOE in August of 2011 and resulted in the following:

<b>COST ELEMENT</b>	<b>\$ Amount (in Billions) 4% Escalation</b>	<b>\$ Amount (in Billions) 1.9% Escalation</b>
Base Estimate	\$4.899	\$4.714
Contingency (85% Confidence Level)	\$1.502	\$1.502
<i>Contingency Percent</i>	<i>30.66%</i>	<i>31.86%</i>
Escalation	\$4.128	\$1.556
Actual Cost to Date	\$0.217	\$0.217
<b>TOTAL PROJECT COST</b>	<b>\$10.746</b>	<b>\$7.989</b>
Note: both are Constrained Funding case		
<b>SCHEDULED COMPLETION</b>	<b>April 2035</b>	<b>July 2031</b>

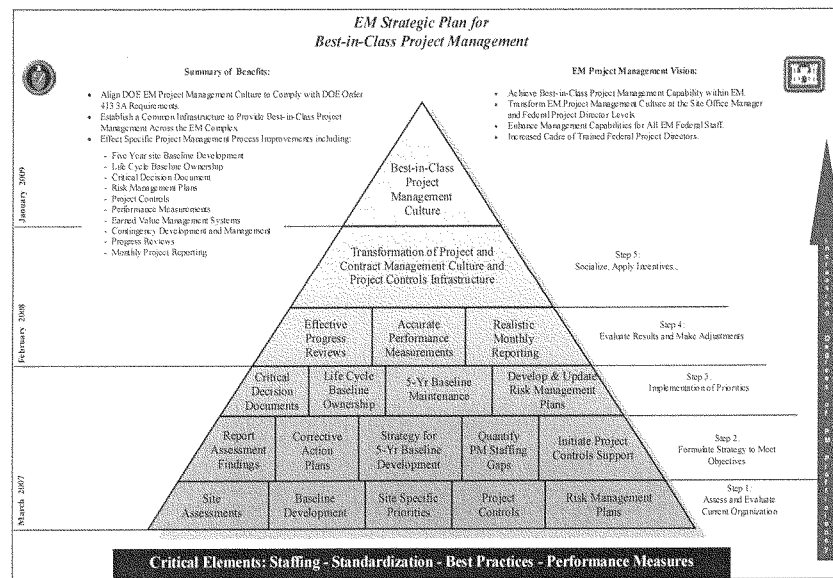
The M&O Contractor used Chief Financial Officer (CFO) escalation rate of 1.9% and the USACE ICE used a local market study rate (ENR) which considered nuclear construction projects.

In April 2012, DOE-APM requested the USACE ICE Team develop a Rough-Order-of-Magnitude (ROM) Estimate for the accelerated construction of the UPF project to support DOE's CD-1 reaffirmation process. The USACE ICE Team updated the revised UPF ICE Point Estimate from February 2011 for non-9212 building capabilities deferral. The ROM Estimate for accelerated construction and non-9212 capabilities deferral of the UPF project results are:

COST ELEMENT (UPF w/Building 9212 Capabilities only)	\$ Amount (in Billions)
Base Estimate	\$2.935
Base Estimate Accuracy Uncertainty	\$0.363
Contingency (85% Confidence Level)	\$0.782
<i>Contingency Percent</i>	26.6%
Escalation (4%)	\$1.371
Actual Cost to Date	\$0.399
<b>TOTAL PROJECT COST</b>	<b>\$5,581</b>
Note: Constrained Funding case	
<b>SCHEDULED COMPLETION (CONSTRAINED w/CONTINGENCY)</b>	<b>May 2027</b>

### DOE-EM Best-in-Class Project & Contract Management Initiative (2007-2009)

In early 2007, the Assistant Secretary for Environmental Management summarized the Strategic Plan for achieving the BICPM/CM vision using the following graphic:

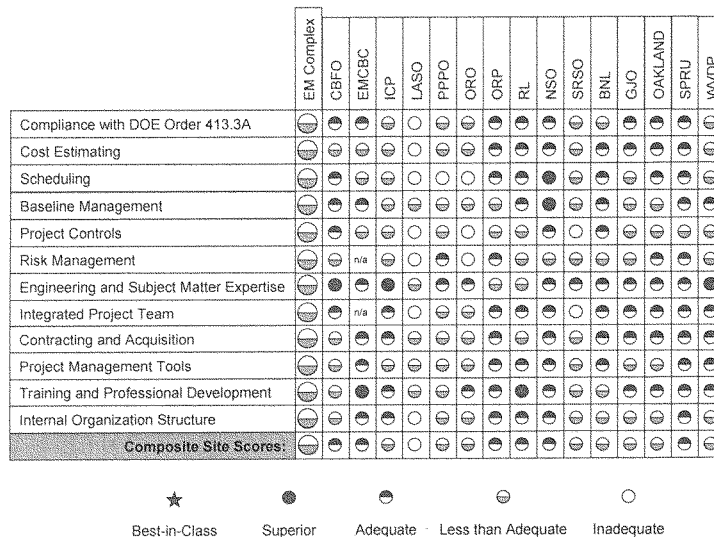


In February of 2007, DOE-EM requested Interagency Support from USACE Huntington District aimed at developing Best-in-Class project and contract management capabilities for all EM sites. DOE-EM developed a five-phased approach to accomplish this goal with support from USACE which included the following:

1. Develop Assessment Criteria & Work Plan
2. Perform EM site assessments and complete assessment report
3. Develop a Corporate Implementation Plan (CIP)
4. Implement the BICPM/CM Initiative Corporate Implementation Plan
5. Institutionalizing the BICPM/CM Initiative

Phase 2 Assessments of 16 EM sites were performed in 2007 and evaluated strengths and weaknesses in 12 key Project Management capabilities and three contract management benchmarks. The results of the Phase 2 assessment are contained in the following figure:

The results of these Assessments confirmed the results of other reviews, including the National Academy of Public Administration's (NAPA's) management review of the



DOE EM Program and the DOE Office of Management's Root Cause Analysis of Project and Contract Management. In each of these reviews, the shortage of qualified resources dedicated to supporting Federal management functions was identified as a primary cause for Project Management and Contract Management difficulties within DOE EM. The Assessments identified more than 150 specific positions that are

necessary to achieve BICPM/CM. These positions are summarized in the Error! Reference source not found.

#### Summary of Personnel Needs to Achieve BICPM

	EMCBC	LASO-EM	PPPO	ORO	ORP	RL	SRSO	All Others	Total
Project Controls	2	2	5	4	3	6	11	11	44
Cost Engineer	5	1	3	4	1	2	4	3	23
Scheduler		1	3	4		2	4	1	15
Risk Analyst	2	1	1	1	2	5	2	4	18
Other PM		12			1	8		3	24
Property Mgmt Spec	2		1		2	2	2		9
Cost/Price Analyst	3		1	1	2	2	2	1	12
Contract Spec	2		2		2	3	5		14
<b>Total</b>	<b>16</b>	<b>17</b>	<b>16</b>	<b>14</b>	<b>13</b>	<b>30</b>	<b>30</b>	<b>23</b>	<b>159</b>

The BICPM/CM Corporate Implementation Plan (CIP) identified 18 Recommended Priority Actions (RPAs) that DOE EM should undertake to address these challenges and to implement BICPM within DOE-EM. The 18 RPAs are as follows:

1. Assign Leadership for BICPM Implementation.
2. Provide Additional Project Management Resources.
3. Provide Additional Contract Management Resources.
4. Address Unresolved Baseline Change Proposals and Request for Equitable Adjustments.
5. Develop and Improve Federal Work Plans at Each Site.
6. Provide Project Management and Contract Management Capability Reinforcements.
7. Complete DOE EM Project Management Guidance.
8. Clarify Roles and Responsibilities between Project Management and Contract Management Organizations.
9. Update and Implement Human Capital Plans.
10. Establish a Standardized and Integrated Change Control Process.
11. Establish Standards for DOE EM Management Products and Practices.
12. Implement Enterprise Project Management Software Solutions.
13. Streamline Critical Decision Document Review and Concurrence.
14. Complete and Utilize Federal Risk Management Plans.
15. Maintain Validated Federal Five-Year Baselines and Out-Year Planning Estimate Ranges.
16. Implement Surveillances of Contractor Earned Value Management Systems.
17. Identify Site-Specific Best Practices and Adopt across the Complex.
18. Prioritize Training and Professional Development.

Two additional RPA's were later identified and added to the above list:

- 19. Cost Pricing Data
- 20. Program Level Risk Analysis

USACE provided support on most of the Recommended Priority Actions (RPAs) listed above with the exception of 4, 5b, 17, and 18, resulting in increased PM/CM capabilities within DOE-EM. The USACE support on RPA's 2 and 3 were intended to be a capability gap bridge until DOE-EM hired federal staff to perform these functions. In July of 2009, per the request of EM-1, USACE performed an "Assessment of the BICPM/CM Performance and Resource Utilization". The three key recommendations of this assessment were as follows:

- 1. Sustain PM Strengths to date by a "tailored" extension of USACE resources
- 2. Build a strong training, lessons learned, and mentoring program beyond what was designed in RPAs 17 and 18.
- 3. Address and assess "total" federal field construction project staffing needs

At the time of this assessment, DOE-EM had backfilled approximately two-thirds (109) of the FTE capability gaps with either full-time federal employees or contractor support personnel. It is unknown whether or not the hiring freeze at the time of the assessment was eventually lifted and additional federal staff hired and trained to meet the capability gaps that remained for approximately 50 FTE's.

#### **DOE-EM & USACE – the Project Management Partnership (2009 – Present)**

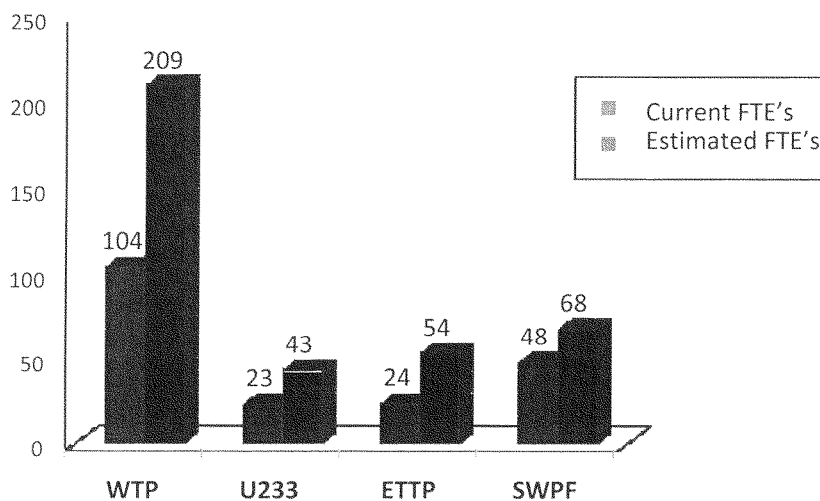
In October of 2009, USACE and DOE-EM transitioned from the BICPM/CM Initiative into the Project Management Partnership (PMP). Under this PM Partnership, USACE has continued to provide some basic level of either discrete or steady-state support to DOE-EM under recommendation one above. Based upon recommendation number three above USACE provided its in-house construction and project management expertise and awarded two Project & Construction Management AE support contracts per DOE-EM's request. DOE-EM has not requested support for recommendation number two to date. USACE has provided additional support under the PM Partnership to DOE-EM for Project Peer Reviews on several projects for cost, scheduling, project management, risk analysis, and nuclear safety subject matter expertise. The performance of EM projects continued to be under scrutiny from various organizations in the 2009-2010 timeframe with numerous studies from both internal and external teams and organizations. Working under the Project Management Partnership (PMP) with DOE-EM in May 2010, USACE was requested to develop requirements-driven, activity based, detailed staffing estimates for four capital construction projects. These estimated specific functional position types, composition, and numbers of staff required for the management and oversight of the following four DOE-EM projects:

- 1. Waste Treatment Plant (WTP) in Hanford, WA
- 2. Salt Waste Processing Facility (SWPF) in Aiken, SC

3. Uranium-233 Downblend (U-233) in Oak Ridge, TN
4. East Tennessee Technology Park (ETTP) in Oak Ridge, TN

The results of the Detailed Staffing Estimates for these projects were developed to be reasonable, traceable, credible and defensible and support DOE-EM's Human Capital Management. Resource requirements were divided into the following ten categories: Acquisition, Contract and Subcontract Management; Project Planning, Control, and Management; Science, Engineering, and Design Support; Construction Oversight and Management; Environment, Safety and Health; Quality Assurance; Finance and Administration; Safeguards and Security; Startup and Commissioning; and Public Affairs and Stakeholder Relations. However, the recommended staffing levels would not address the impact of an incomplete design on the ability to properly manage the cost and schedule performance.

The following figure illustrates the Detailed Staffing Estimate results versus actual staffing levels in FTE's at that time for the four capital asset construction projects.



In closing, I would like to thank our partners in the Department of Energy for requesting and utilizing Interagency support from USACE. The USACE cost engineering community of practice and I appreciate the opportunity to serve DOE in support of their ongoing mission.

Thank you, Mr. Chairman and members of the Subcommittee. This concludes my statement. I will be happy to answer any questions.

Mr. FRELINGHUYSEN. Thank you, Mr. Ferguson.

Mr. Eckroade, welcome.

Mr. ECKROADE. Thank you. I would like to thank you for the opportunity to be here today to discuss the Office of Health, Safety, and Security or HSS's role in overseeing the Department's nuclear operations, including nuclear projects.

HSS as a staff office reports directly to the Office of the Secretary, and on behalf of the Secretary we undertake policy development, technical assistance, training, independent oversight, and regulatory enforcement activities in the areas of safeguards and security, classification, occupational safety and health, and nuclear safety.

In the Department, contractors design, build, and operate our nuclear facilities. DOE is the owner and safety regulator of these facilities and has a comprehensive set of regulations, policies, and technical standards that guide our contractors in these important duties. Effective oversight of contractor operations is an integral part of the Department's responsibilities as a self-regulatory agency. Essentially, it provides assurance to its leaders, to its workers, and to the public of a safety posture.

DOE line organizations, such as NNSA and EM have the primary responsibility for ensuring existing nuclear facilities and new nuclear projects meet the Department's safety expectations. They oversee all aspects of the design, construction, ultimately approve the safety basis, and authorize the operations. HSS has an important complementary role in ensuring that safety is appropriately considered in facility design and construction and that operations during the life of the facility meet DOE safety requirements. Independent oversight of nuclear safety continues to be one of HSS's highest priorities.

Reforms that were implemented in the Department beginning in 2010 and very much consistent with the recommendations from GAO on improving independent oversight of nuclear safety have indeed enhanced HSS's oversight of nuclear operations. Let me just go through a couple of the enhancements. One of the things that we did was increase the transparency of our regulatory process by making all oversight reports available online. We enhanced our nuclear safety capabilities through recruitment of senior-level technical staff. And we refocused our oversight in the area of safety on the highest risk nuclear facilities including projects.

Our oversight of nuclear projects focused primarily on the safety basis and facility design, quality assurance, construction quality, and ensuring readiness for start-up and project turnover for operations.

We prioritize oversight using a sampling strategy that considers facility hazards, the complexity of past project performance, and the status of design and construction. One area of particular focus I like to note is as directed by the Secretary, HSS performed a series of evaluations of safety culture at selected nuclear projects, first at the Waste Treatment and Immobilization Plant (WTP) in response to indicators of safety culture concerns and then to determine the extent of condition at the Department's other large projects, and even looked at safety culture at a few other areas in operations. We have learned much from these assessments and



have a better understanding of how much work remains to establish a healthy safety culture. In essence, we recognize we are at the beginning of a very long journey.

In response to reporting requirements established and promoted by the Subcommittee, last month we published our first annual independent oversight report. The report documents our strategies for conducting oversight, progress and transforming the organizations building the necessary skill sets, and summarized the many activities completed in 2012.

We appreciate the Subcommittee's continued focus on the Department safety program, the safety of large, nuclear projects, and on HSS's independent oversight program.

Mr. FRELINGHUYSEN. Thank you, Mr. Eckroade.

Mr. Trimble, front and center. Nobody wants to be on the High-Risk List.

Mr. TRIMBLE. You are hurting my feelings.

Mr. FRELINGHUYSEN. We know that GAO continues to look at hopefully every project, right?

Mr. TRIMBLE. Yes, absolutely.

Mr. FRELINGHUYSEN. Operations and maintenance. But there is a view that have some projects been dropped off the High-Risk List? What is the criteria for dropping people and projects off? Are these the small projects?

Mr. TRIMBLE. Yes. So broadly what we have done with the Department of Energy is narrowed the focus to the major projects because the progress we have seen and because that is where most of the money is. We are going to keep paying attention to see—

Mr. FRELINGHUYSEN. You are?

Mr. TRIMBLE [continuing]. On the non-majors. Absolutely.

Mr. FRELINGHUYSEN. So you are not giving a clear bill of health to all those small projects, are you, since we noted at least one at Los Alamos that continues to have some problems. Is that not right?

Mr. TRIMBLE. Absolutely.

Mr. FRELINGHUYSEN. Which is a pretty important one.

Mr. TRIMBLE. As well as the waste Solidification Building.

Mr. FRELINGHUYSEN. Security, right?

Mr. TRIMBLE. Yes. And waste solidification building as well. So the key for removal from the High-Risk List is you have to demonstrate through independent means that the reforms you have made have been sustained, and they have achieved the objectives they set out to be. So one of the things we have to do over time is just to monitor them to make sure that the changes we have noted which have seemed to prove results continue to prove results.

Mr. FRELINGHUYSEN. Yeah. So you are intimately familiar with all these milestones that have been set. The terminology changes every couple of years but you are intimately familiar with all these?

Mr. TRIMBLE. I have got my cheat sheets, too.

Mr. FRELINGHUYSEN. You do? So the wording may change but in reality we want everybody to measure up.

I want to get a little bit of a clarification here. If you are looking at larger projects, are you looking because of the size obviously? What is more important, the size or the contractual mechanisms?

Mr. TRIMBLE. Well, in the context of high-risk and the definition of major versus non-major, the threshold is \$750 million, and that comes from DOE. That is DOE's definition of how they distinguish between major and non-major projects.

Mr. FRELINGHUYSEN. So the contract mechanisms exists on all contracts; right?

Mr. TRIMBLE. That is correct.

Mr. FRELINGHUYSEN. And is it less important in smaller projects?

Mr. TRIMBLE. No. I mean, the contract on a \$500 million project, the contract mechanism, the oversight tools, et cetera, are critical, obviously.

Mr. FRELINGHUYSEN. How would you characterize the progress that GAO has made in terms of implementing your recommendations?

Mr. TRIMBLE. Well, I think DOE, especially in the last few years, has made significant improvements, as I mentioned in my statement, in terms of issuing policies, taking steps to institute the 90 percent design criteria, outside independent reviews, greater use of independent cost estimates. So all of those are significant and important steps.

Mr. FRELINGHUYSEN. Are not some of these very problems happening again and again?

Mr. TRIMBLE. Well, our concern with regard to major projects is that we see the recurrence of these cost and schedule problems.

Mr. FRELINGHUYSEN. Even in the responses that you witnessed.

Mr. TRIMBLE. Absolutely.

Mr. FRELINGHUYSEN. I will not say some hesitation but—

Mr. TRIMBLE. No, absolutely.

Mr. FRELINGHUYSEN. Not a lot of clarity here.

Mr. TRIMBLE. We are waiting for the proof in the pudding.

Mr. FRELINGHUYSEN. Yeah. I mean, the establishment of baselines.

Mr. TRIMBLE. Exactly.

Mr. FRELINGHUYSEN. A lot of moving targets around here.

Mr. TRIMBLE. Exactly.

Mr. FRELINGHUYSEN. Does that not concern you?

Mr. TRIMBLE. Oh, absolutely.

Mr. FRELINGHUYSEN. This is what you focus on; right?

Mr. TRIMBLE. Absolutely. And we have ongoing work on all of these major projects, and we continue to uncover disturbing patterns.

Mr. FRELINGHUYSEN. Well, are you noticing any particular trends?

Mr. TRIMBLE. Well, areas—

Mr. FRELINGHUYSEN. You know, good ones or bad ones?

Mr. TRIMBLE. Well, I mean, I think what we have noted—

Mr. FRELINGHUYSEN. We do not want things to be buried in new terminology.

Mr. TRIMBLE. Yes, absolutely.

Mr. FRELINGHUYSEN. That is why we have the GAO. It is supposed to root any of that out.

Mr. TRIMBLE. That is right. I think some of the issues we have uncovered are items you have discussed earlier about design maturity, technology readiness. Those are continuing issues. Obviously,

you see that with WTP as an ongoing problem behind their concerns there, but we also found that in terms of MOX in terms of the design of the glove boxes to handle plutonium.

Mr. FRELINGHUYSEN. Are you keeping an eye on the Army Corps that is sitting next to you as well?

Mr. TRIMBLE. They are in our building. We are one floor away.

Mr. FRELINGHUYSEN. Well, I know that.

Mr. TRIMBLE. I am sure they keep an eye on us.

Mr. FRELINGHUYSEN. I am just saying that you are all in there together.

Mr. TRIMBLE. Yes.

Mr. FRELINGHUYSEN. But obviously the Committees, one of our major jurisdictions is the U.S. Army Corps of Engineers. And we obviously salute their work here at home and abroad, and obviously have a particular responsibility for the nuclear enterprise. But you keep an eye on them as well?

Mr. TRIMBLE. Well, we have another group that does work, particularly on their projects.

Mr. FRELINGHUYSEN. I mean, independent, like Mr. Eckroade.

Mr. TRIMBLE. Yes. We do a lot for—

Mr. FRELINGHUYSEN. An independent evaluation of some of their cost estimates here.

Mr. TRIMBLE. Absolutely.

Mr. FRELINGHUYSEN. They are in this business, too, here.

Mr. TRIMBLE. Yes. I believe it is another part, another team within GAO that does our—

Mr. FRELINGHUYSEN. Just because you are in the same building you do not necessarily cut them any slack. Is that right? Just say that for the record.

Mr. TRIMBLE. No. No. I will not even let them buy me coffee.

Mr. FRELINGHUYSEN. Good. I am very glad to hear that.

Ms. KAPTUR.

Ms. KAPTUR. Thank you, Mr. Chairman.

Mr. Trimble, you strike me as a man with a rigorous eye. How often do you see cost misestimates and overruns such as you note with the DOE major projects?

Mr. TRIMBLE. So how often do we see that? I mean, I think on all of the major projects we have looked at, we have seen it.

Ms. KAPTUR. But in other agencies, how significant is the overrun in DOE compared to—

Mr. TRIMBLE. You know, I have not done or I do not think we have done any direct comparison I know between the two.

Ms. KAPTUR. I have never seen it at the VA. I have never seen it at HUD. I have never seen it at NASA. I have never seen it at NSF. I look around at all of the departments, EPA. These are mammoth. So they are pretty atypical would you not think across the federal agencies—now, Defense is another question, but even there DOE is a lot smaller than the Department of Defense. These are pretty significant.

Mr. TRIMBLE. These are very significant, and again, I think as you alluded to, the numbers are staggering.

Ms. KAPTUR. The numbers are staggering. And, you know, I keep asking myself is this a research project or is this just a preprocessing project or a storage project? We heard earlier there

are problems with the nuclear supply chain, et cetera. I am asking myself what can we do to hasten the completion of whatever it is we are trying to complete here on schedule and under budget. And I did not get a lot of confidence from the prior panel, first on what end we are attempting to reach here, and that we can actually complete segments of it on time and within budget or under budget. I just wonder if we are mixing science and construction in a way that we cannot win; that we are going to fail from an accounting standpoint. Do you have any views as you have gotten into their accounts, as you look at this, is there something that we are not seeing here or is it just internal disarray inside of DOE?

Mr. TRIMBLE. Yeah. I mean, I think, you know, some of it with WTP in particular. That is sort of the poster child for starting construction on a fast track when the design is not complete. And so that seems to be sort of we keep paying the bill for those mistakes from the past, and as well as decisions to keep moving forward when design is not complete.

You saw that same failure or I think we are seeing the same failure. Our work is still pending at MOX in terms of the glove box design. So that is an area. One thing we have not talked about a little bit in terms of areas of focus is that there is a lot of discussion of these peer reviews, et cetera, and these controls they are putting in place to put a check on it. The question that we are looking at in our ongoing work is what is the effectiveness of those controls? So you could have a flag go off. You can have a light on your dashboard go off but you can ignore that light. Your engine light goes on, you can just never take it to the mechanic, right? So the question is when these systems—are the lights going off first of all? You have a system. Does the light go off when it is supposed to go off? And then what do you do about it?

So, for example, with the Waste Solidification Building, in 2008 there is an independent review that says what you are estimating for this cement work, this concrete work, is way off. You are saying it is \$60 million; we think it is going to be 110 million. They do not change anything. Well, guess what? When they put the contract out for bid it is in the 90s. So then all of a sudden you are behind. And then that accounts for a big chunk of their latest cost increase.

So the question is you can have great processes, and this sort of goes to your question about culture. You can have controls, but if your organization culture does not respect and act support every day those controls and those objectives, it does not matter how good your controls are, your culture will defeat it every time.

Ms. KAPTUR. As you listened to the prior panel, what did you think we as a Subcommittee could do to get better results, especially on the three projects that are so expensive if, in fact, we are going to complete them?

Mr. TRIMBLE. Yeah. I wish I had a magic bullet. I mean, I think a few things are: (1) for all the projects, capital asset projects, getting more detail on technology and design readiness; whether outside reviews have looked at those readiness figures. Have they been independently verified and checked? I think if any of them have technology development ongoing—you talked about technology readiness levels, getting behind that to say, well, you are saying it

is at 5, you are saying at 6. How is that verified? What is behind that? What is the schedule for that? And I think for all of these projects, the consistent problem we have seen in all these projects has been the seismic concerns which inevitably pop up late. So up front, tell me now, it is not going to be news to anybody that there are seismic issues. So what are we doing with it now? I think the effectiveness of the project reviews, one area——

Ms. KAPTUR. Effectiveness of the?

Mr. TRIMBLE. Project reviews. So when you have these outside reviews, you know, my analogy is the concern is always that you are basically hiring an outside audit firm to do your weekly payroll. Right? It is like you are doing these outside concerns. Well, what are your controls to make sure you are making the right decision? If you are always waiting for this outside group to bail you out, to flag the problem, you have a failure elsewhere. So how good are those controls versus these independent audits.

Ms. KAPTUR. Is it your sense inside the Department that there is a rigorous organizational structure to deal with these three projects and that there is the kind of discipline that you have in the nuclear Navy?

Mr. TRIMBLE. I cannot speak to the Navy. I am one of the few people in this room apparently that does not have a Navy background.

The reforms they have been putting in place are significant. Their leadership is committed. They are making a lot of the right steps. But again, this is a long slog and my comment about culture is this is not a matter of just fixing this policy or this guidance. You need to be sort of committed 24/7 to this and you cannot mix your messages about the importance of this.

Ms. KAPTUR. Mr. Chairman, I would just say——

Mr. FRELINGHUYSEN. Can you yield on that? It is an issue of who is in the driver's seat here. Is the leadership there? Is it willing to challenge the culture? It is inexcusable that some of these costs have just——somebody should have known what was going on.

Mr. TRIMBLE. But then you have to figure out how you are carrying that message to the lowest ranks at the frontline and then to the contractor community as well.

Ms. KAPTUR. What I am wondering, Mr. Chairman, is if you look at the space station, if you look at some of the other projects we have worked on where billions of dollars are involved, how NASA organized for that effort internally and the kind of organizational structure and discipline that was a part of it. With DOE, they are doing a lot of other things. But how, and I guess I would ask you as an accountant, you studied both numbers and you studied management structure. If you could make recommendations to us on management structure within DOE to accomplish these tasks so we can meet the budget, I keep hearing culture, culture, culture. Well, that is a management accounting issue. And are they properly organized in there to accomplish the task at hand? Any additional comments you could provide now or to the record?

Mr. TRIMBLE. Yeah. I would have to go back to our past work to have an intelligent answer on that. I do not really have one now. I do not think we have done recent work specifically on this structure. But I would be happy to take that for the record.

Ms. KAPTUR. Thank you.

Mr. FRELINGHUYSEN. Mr. Nunnelee.

Thank you, Ms. Kaptur.

Mr. NUNNELEE. Thank you, Mr. Chairman.

NNSA and EM both have reported. Okay, you are building these one-of-a-kind projects. And because of that, progress has been impeded because of the lack of availability of vendors that can produce at a much higher standard.

So I guess my first question is should this not have been expected by now? We did not just start doing this. And secondly, do you see any indication that the Department of Energy is doing anything to actively manage the problem?

Mr. TRIMBLE. Well, I would jump in on that. Just taking again MOX, the contractor hired was the foremost world expert on nuclear construction and handling these very specific kind of facilities. So the experience and being surprised by it you would not expect them, of all people, to be surprised by it. Moreover, as I alluded to, there was a provision in the contract to do market surveys on the very things we are talking about—labor, materials, et cetera, in order to meet the contract. We are looking at, again, they had a good control but what happened to it? Were the reports submitted? Right now we are having trouble finding them. So the question is, and again, it goes to culture. You have got a requirement. Did the people managing it respect that requirement and act on it? And so if you had had those reports in 2007 and you flagged these concerns would you have been able to do other course corrections?

Mr. NUNNELEE. So what kind of capabilities did the DOE contractors who asked to build these have to address on this issue? Have there not been some specific actions taken by some of the contractors, like sending personnel out to vendors that have led to improvements in certain cases?

Mr. TRIMBLE. I do not have a lot to say on that from our recent work, but I believe that is right. I believe it is more of the tactical responses to these issues.

Mr. FRELINGHUYSEN. Mr. Fleischmann.

Mr. FLEISCHMANN. Thank you, Mr. Chairman. And I do appreciate the discourse about all the cost overruns. We certainly want to be more fiscally wise and efficient as we move forward in all these large projects, including the UPF which is in my district.

I am going to change direction a little bit. Mr. Trimble, I have noticed that the Department of Energy is using the Corps of Engineers to perform contract work, building an access road at UPF. Does the GAO believe that using the Corps of Engineers to do preliminary work is a smart strategy, sir?

Mr. TRIMBLE. We have not formally addressed sort of the decision and whether it was a good decision or was a bad decision. I can tell you that we visited the site a few weeks ago and the assessment at the time was that the Corps could do the job, I think, better and cheaper than outside contractors because it was the kind of project that is right in their wheelhouse.

Mr. FLEISCHMANN. Okay. And you still believe that?

Mr. TRIMBLE. I am just telling you what they told us, and it seems reasonable.

Mr. FLEISCHMANN. Okay. Mr. Ferguson, what kind of support has the Corps given NNSA and EM over the past three years? And as a follow-up to that, sir, what are the Corps' future plans in this regard?

Mr. FERGUSON. In the last three years we did the Best of Class Project Management Initiative, which assessed the capabilities of Environmental Management's office, site office for complying with project management key components with the staff and did a gap analysis of each site and determined that they were understaffed at that time in key areas—project management, cost estimating, and scheduling. We made recommendations to support their human capital plan to get the right people in the positions to manage their projects.

We then did detailed staffing plans for their major projects and the detailed staffing plan resulted in us providing that on the construction management side of the house; they needed to beef up their structure management. It is really the ground truth. Their contractors' reporting systems earn values and have construction oversight, more construction oversight at the site.

The next one is at the UPF. We provided independent cost estimates for the Uranium Process Management. We wanted to get an independent look before they baselined the project. We went in, and from the bottoms-up detail, did an independent cost estimate for them to see what the cost would be, what the range of costs would be at an 85 percent confidence level and to help them determine the fairness and reasonableness of M&O's contractor there.

We are in the process of working with the Department of Energy to rebaselining MOX and the Salt Waste Treatment Facility.

Mr. FLEISCHMANN. So those are your future plans?

Mr. FERGUSON. That is the future plan.

Mr. FLEISCHMANN. Okay.

Mr. FRELINGHUYSEN. Would the gentleman yield?

Mr. FLEISCHMANN. Yes, sir.

Mr. FRELINGHUYSEN. Did you have any sense whether the contractor had the capability to conduct an accurate cost estimate?

Mr. FERGUSON. The contractor has a different methodology and different way to develop their cost estimate from reconciliation of the estimate with ours, but we did not assess to determine the reasonableness of the M&O contractor. We supported that data to the Department of Energy.

Mr. FRELINGHUYSEN. So they had the data or not had the data? Did they have the data? The proper data?

Mr. FERGUSON. Yes.

Mr. FRELINGHUYSEN. Did it match your data?

Mr. FERGUSON. The M&O did a cost estimate based on historical data, and the level effort type work for the Uranium Process Facility and had an estimate where we did a bottoms-up estimate detailed off the 40 percent design. We then crosswalked it to see where the difference was in the estimates and then revised our estimates and furnished that to the management team at the Uranium Process Facility on site.

Mr. FRELINGHUYSEN. So translating that into a way that I can understand, what does that actually mean?

Mr. FERGUSON. That means that the—

Mr. FRELINGHUYSEN. I know that the Corps, as you said, is results-driven, but getting back to Mr. Simpson's earlier admonition, let us focus on what is important—on time, on budget. And your estimates are?

Mr. FERGUSON. The estimate we provided is a risk-based, managed estimate. We feel that the 40 percent design, which is not the performance baseline yet, is a good gauge. It gives support to the YSO management team. What to focus on are the key issues to implement that project within schedule and within cost.

Mr. FRELINGHUYSEN. Thank you for yielding.

Mr. FLEISCHMANN. Thank you, Mr. Chairman. I will just follow up with one quick question.

Mr. Ferguson, I know you have addressed some of the future goals, but what services can the Corps provide to NNSA and EM? In your view, what are the limits? What can you do and what can you not do for DOE?

Mr. FERGUSON. I feel that we can provide independent cost estimates where we can develop a product. And we can do independent reviews, peer reviews. We can do construction management. If you have a separate piece of work that is within the course of technical requirements that we can complete, we can do that. And I think we can do cost estimates and schedules and risk analyses for them and bracket the risk on a project and run through our Monte Carlo process and the level of technology, the level of technical readiness levels, and try to bracket the risk so you will get a risk contingency on a project where you could implement the project within the budget if you did that upfront. We would have to take a team of subject matter experts to do that. Where the TRL is not developed to a certain level, you have to know the impacts. What are the impacts to your design when that TRL changes to your project? And put that in your risk ratio and run that and get your contingency so you can implement your project within the total project cost.

Mr. FLEISCHMANN. Thank you, Mr. Chairman. I yield back.

Mr. FRELINGHUYSEN. Thank you, Mr. Fleischmann.

So what are the primary drivers of the total cost of the Uranium Processing Facility?

Mr. FERGUSON. The difference that we indicated at the site, it was the capacity and capability in the out years. The M&O contractor used a level effort, the Corps used the detailed bottoms-up approach doing that, and that is being able to train the employees for two shifts to meet the capacity. And that is about \$500 million higher. It is significantly higher in the out years on the capability capacity on that contract. And we did that. That is one of the main things.

And the next one is we are about \$450 million in the methodology in the main construction of the facility.

Mr. FRELINGHUYSEN. This is a pretty important project here, substantial investments here. There are a lot of uncertainties, are there?

Mr. FERGUSON. Yes, they are.

Mr. FRELINGHUYSEN. They are. And is this likely to see cost overruns?

Mr. FERGUSON. Well, see, the performance baseline had not been set yet, and that is just a tool—



Mr. FRELINGHUYSEN. Yeah, but you have been around long enough to know. You have a sense of things. I assume Mr. Trimble might want to jump in here. But this sort of—

Mr. FERGUSON. I would do an independent estimate, the 90 percent design, and I would run the risk—and have an outside agency review that document for you to set the budget on that.

Mr. FRELINGHUYSEN. The outside agency might be you, Mr. Trimble? You do not have enough on your plate? Maybe you have made this review, have you?

Mr. TRIMBLE. Maybe 2 o'clock today will be better.

Mr. FRELINGHUYSEN. Okay. Get working on it, will you?

Mr. TRIMBLE. On UPF, just to highlight a couple of things. One, when we are talking about when you are looking at the cost increases you have to remember that the current estimate is reduced. It includes reduced scope. So the current estimate is less than what it was originally.

The next thing is, in 2011, there was an independent cost estimate. That triggered them to have to revalidate their initial decision, CD-1, because the increase was more than 50 percent above the previous high estimate.

They reaffirmed CD-1 last June. This is one month after the contractor told them that the building is too small, the roof is too short, and it is not wide enough. And what they found out last Spring, this is within a year after having done the independent cost estimate, was that they have to raise the roof 17 feet, it is going to add about \$500 million in another year to the project.

So again, independent cost estimates are critical but there has to be some sort of internal controls that help make that ship go in the right direction.

Mr. FRELINGHUYSEN. I will not say no pun intended. This would raise the roof in a lot of circles.

I want to leave Tennessee alone for a few minutes here and focus on Mr. Eckroade, who has not had a chance to talk very long. The Committee directed some responsibilities for you to focus on the Waste Treatment Plant out in Washington State, relative to the culture. But this is not unrelated to some of the things the GAO has been doing. You have come up with some pretty substantial recommendations. Could you both talk about the time you have committed to study this project out there?

Mr. ECKROADE. Certainly. Thank you for the question.

Mr. FRELINGHUYSEN. You performed a review. Maybe just cover that for the Committee and some of your findings.

Mr. ECKROADE. For WTP, since 2008, we have done a number of reviews and we have actually been increasing the frequency of our safety reviews based on our strategies to focus more attention to nuclear facilities and nuclear projects. The most fundamental review we have done at WTP has been on nuclear safety culture. That was a foundational experience for us in HSS and the Department of Energy to really understand what really constitutes a good nuclear safety culture and how do you assess it.

So as we are trying to understand this most important area, we actually went out to the NRC and learned their method. They are much more advanced in thinking and advocating for healthy nuclear safety cultures. And so we actually contracted with a com-

pany, independent consultants, who do this work for a living and so we used these consultants and we went out to WTP and interviewed. We did a number of things. To be able to do a good nuclear safety culture assessment you actually have to do a functional analysis. You see how the organization describes itself. Then you actually reach out and do surveys. There are a couple of survey methods that are very mature and formal. Then you have focus groups. We actually talked to people who have similar kinds of responsibilities and duties. You can really pull together some common themes in safety culture. So WTP was our first effort to really do this in an authoritative way. Fundamentally, we found some troubling concerns about the safety culture at the time when we published the report last year.

Mr. FRELINGHUYSEN. Which should be applicable to a lot of sites; right?

Mr. ECKROADE. And they are. In fact—

Mr. FRELINGHUYSEN. Yeah. I mean, all sites to some extent.

Mr. ECKROADE. Sure. And since we did WTP, the secretary directed us to do extended condition reviews, large nuclear projects, and several other locations. Many of the themes that we are seeing on safety culture at WTP, we have also seen some of the same kind of trends at other projects, you know, to varying degrees of severity. So what this is telling us is that the department is not yet focused in a sustained way on nuclear safety culture. I will tell you that the Secretary has articulated in a nuclear safety memo last year that his expectations for establishing a strong nuclear safety culture. We have incorporated guidance on the nuclear safety culture into some of our policies, but in practice we have a long ways to go to really understand that, to make our managers at our sites and our projects embrace the values of a good, healthy, safety culture, and to effectively engage the employee so they believe the values that we have for safety, and they see us and they see the managers modeling the behaviors of a good safety culture and they feel free to raise the issues and have confidence those issues will be resolved and they will not be retaliated against. So we have a lot of work to do to bring healthy safety cultures to the Department.

Mr. FRELINGHUYSEN. And you add in layoffs and furloughs, that makes life even more complicated.

Mr. Trimble, and then I will go to Ms. Kaptur.

Mr. TRIMBLE. We have been looking at WTP or its predecessors for I would say close to 20 years at this point, a long, long time.

Aside from the obvious cost increases and delays, I mean, a couple things I would highlight for you. One is from our report we finished last year, in 2012. Again, we highlighted technology issues involving the mixers. For the process, they have to keep the waste mixed, which is very, very difficult and highly technical and challenged. There are some issues with buildup of explosive gases. There are issues characterizing the waste that is in the tanks. These are not new issues. These have been around for many, many years. And actually, in 2006, as I was reading through our library on this subject, there is a statement in there that DOE, someone from DOE thought they had resolved all these technical issues. And I think this goes to your comment about is this a science project or a build project.

One point on this, and as you all have raised the concern about proceeding to construction before design, and technology issues are resolved, in Mr. Raines's comment he noted that on UPF they will not proceed until they are technology ready and there is level 6. Our recommendation has been it is technology level 7. And the whole TRL concept comes from NASA. Again, it has its roots.

Mr. FRELINGHUYSEN. You are going to get Ms. Kaptur even more excited.

Ms. KAPTUR. Yes. I am really paying attention, Mr. Chairman.

Mr. FRELINGHUYSEN. She was engaged. Now she is really engaged.

No, you are aware, of course that there are issues at Hanford. Huge issues. It is a massive site. I mean, it is absolutely amazing, this part of the Manhattan Project. I was familiar with Oak Ridge. Our Oak Ridge member has left but I can say I was familiar with it but I was unaware of just the massive effort. And of course, there are some legal issues here, huge legal issues.

Now, you take those into consideration, obviously. It is more than politics. They have consent decrees. And talk about milestones. There is so much anticipation out there that these issues are going to be addressed. So how do they fit into your mix here? Do you acknowledge that there are—

Mr. TRIMBLE. Yeah, I think—

Mr. FRELINGHUYSEN. You offered or suggested that maybe the whole thing ought to be halted, is that right?

Mr. TRIMBLE. Well, on terms of proceeding with construction, until you can prove the technology and prove the design. That is the issue. So otherwise, you just end up with delays and redesign. And the current effort, you know, there was partial stand-down and some of the construction work till they could resolve this. One of the issues in the rebaseline, they have also asked the contractor to look at possible new technology or design changes to the whole thing. So maybe they need another building to deal with some of the waste so it does not clog the pipes.

So again, all that adds time and money. So haste makes waste.

Mr. FRELINGHUYSEN. Thank you. Have I supercharged you, Ms. Kaptur?

Ms. KAPTUR. Mr. Chairman, this has just been a very, very important panel, and I thank you for testifying today to help our country figure a way out of this situation.

Any additional insight you can give through records submissions on the management accounting side? Did you deal with these technology issues? These issues will be appreciated by this member for sure. And I have a hunch our chairman as well. You have added a clarification that we have not had earlier. So your work has been valuable as we attempt to embrace the future with probably some scientific and engineering challenges that were not fully spelled out at the beginning in a way that was comprehensible to those who have to approve spending up here. So I think that is really very valuable.

Also, it may be in your report but, you know, unwinding what went wrong, I asked the prior panel—you probably heard what they thought was the worst example. And that can be instructive as we move ahead as well so that we set up these speed bumps to

know how to handle projects of this size. That would be very, very helpful. I was not aware of the level 6 versus level 7. That is a level of detail I did not have. That was a very interesting addition to the hearing record today.

I wanted to ask if I could, relating to workforce concerns, in your latest High-Risk List, you noted workforce planning efforts as a continuing concern, both at NNSA and at EM. And I have long had a concern about workforce readiness and safety standards, simply not so much because I have any of these facilities in our region. We do not. But because of what I have seen happen in the nuclear power commercial industry, and some of the mishaps that have occurred. And I am curious about recommendations you could provide either a little bit of a summary now, or for the record for dependable and steady training programs for the technical positions necessary. And I am including operational positions as well in the nuclear power industry, involving perhaps partnerships that you may have imagined between different elements of the government, private industry, operators that are out there because, as I said, at a prior panel, earlier this week. It was actually operational workers who, at great risk to themselves, saved our community three times.

And they had training, but when they reacted to emergency situations, they put their own lives at risk, not knowing what would happen. And for years I have tried to get training programs linked to our trades in the region that I represent and it has not happened. I tell this story because we have lived it. Nuclear Regulatory Commission, which is not your concern directly, put the largest fine in American history on a plant that I represent. And as that fine was assessed, I actually called the Nuclear Regulatory Commission. I said, I really think when you assess the fine rather than those dollars going back to the general treasury, you really ought to look at diverting some of those dollars to training programs because we have now been through this. This is our third time with a third incident. And each incident was different.

And what happened is most of the money went back to the Government of the United States. Not a penny of it went into training programs. Some of them went to help to develop a national park, some of them went to a renewable program. I support renewable. It was very small. And I just sat back in my chair and I thought, what is the problem here? Why can we not get more rigorous training for those who are involved in this, a greater understanding of the systems with which they are working. And so my question to you really is for the whole chain of skills involved in this, and by the way, these workers that I represent travel around to other locations through the fine process we discovered that they were carrying nuclear particles on their clothing that were discovered in the places that they were staying and so forth. It was unacceptable. It was not their fault. The NRC knew that there were some slippages at that plant, but there was not a rigorous NRC enforcement of safety. And so my interest is in the lives of the workers. And dependable training programs because our lives relate to his much they know and what they can do.

So what are your thoughts on training programs, workforce readiness programs that are dependable and steady?

Mr. TRIMBLE. I will jump in but my colleagues here may have more to offer. The area of workforce training is sort of out of my lane at GAO. I know we have got teams that work on those kinds of issues and I would be happy to get back to you for the record, see if I can find anything that would be constructive on that point.

Ms. KAPTUR. Okay. Yeah, your report, your high-risk report listed it as a continuing concern.

Mr. TRIMBLE. Yes. I think those work for the workers, and I will go back and check this. They are more in the areas of acquisition project management kind of positions as opposed to the technical kind of positions.

Ms. KAPTUR. Very interesting. All right. Thank you so very much. Thanks, Mr. Chairman.

Mr. FRELINGHUYSEN. It has gotten awfully quiet in here which means we are going to get out of dodge in a few minutes.

Mr. ECKROADE, I just want to get back to what we talked a little bit about. After you received some direction from the Committee you went and took a look at the nuclear culture. As you are aware, the Nuclear Regulatory Commission licenses commercial nuclear facilities, and we have a couple that are underway. There was a decision made I think about a decade ago to not seek an NRC license for the waste treatment processing plant. Is that right?

Mr. ECKROADE. Yeah, that is correct. I know early in the planning for that project there was consideration of having that as an NRC license, but I think the reality of that, the department changed its position. I am not sure what level of consultation there was with Congress or NRC.

Mr. FRELINGHUYSEN. Well, the reality is that now you are in the driver's seat. Is that right?

Mr. ECKROADE. Yes.

Mr. FRELINGHUYSEN. And how comfortable. You are the gatekeeper; is that right?

Mr. ECKROADE. Well, the line organizations are the institutions that EM and NNSA, for example, that actually authorize operations of the facilities. And so they have that burden to ensure the safety design, the safety analysis, and specific operational controls are documented and represent the conditions that will make sure that our facilities operate safely over their lifetime.

We actually play a role as a check and balance on the line organizations. We do spot-checks of core nuclear safety processes during the design, construction, and operations.

Mr. FRELINGHUYSEN. So if the NRC is not doing it, what effectively is the DOE doing relative to shall we say licensing a nuclear facility?

Mr. ECKROADE. Right. Before a facility can become operational, typically it is the site office manager level, senior federal manager will actually sign and approve the safety basis documentation for that facility. And the safety basis documentation is the culmination of all the safety analysis, the accident analysis, the hazard analysis, and the analysis of the engineered and administrative controls that must be satisfied to keep that facility in a safe what we call operating envelope.

Mr. FRELINGHUYSEN. But what I am driving at is do you have the capabilities?

Mr. ECKROADE. To license facilities?

Mr. FRELINGHUYSEN. Well, yeah. You know, you are not the NRC.

Mr. ECKROADE. No. Our organization is relatively small.

Mr. FRELINGHUYSEN. Yes, it is. But you have a responsibility which is similar to theirs in terms of if it is not called licensing, what is it called?

Mr. ECKROADE. And actually, in this department, the line organizations and HSS share the regulatory responsibilities. It is not all invested in our office. So it is a shared role.

Mr. FRELINGHUYSEN. So what is the authority line? Is there no line authority on these projects?

Mr. ECKROADE. There is no line authority. It is all within the line organizations. We have the Independent Oversight Authority on behalf of the Secretary.

Mr. FRELINGHUYSEN. So what enforcement mechanisms do you have?

Mr. ECKROADE. We actually have nuclear safety regulations, 10 CFR 830 is the Department's formal regulation for nuclear safety. It covers operations as well as design and construction. And it has really two major components. One is it lays out the quality assurance requirements for those facilities as well as the safety analysis and safety basis controls so we can establish those regulations and our facilities are required to be operating under those regulations. We also have complimentary policies and technical standards that are also contractually enforceable.

So it is actually shared—it is very different than the NRC approach. DOE line organizations actually play key regulatory responsibilities and HSS plays the independent oversight role, kind of the checks and balances role, on behalf of the secretary. We also play the regulatory enforcement role. So we have a staff office for both occupational safety and health, as well as nuclear safety, that does investigations of potential violations, develops notices of violation, and ultimately we will issue those to our contractors. If it is NNSA, the NNSA administrator actually will issue those notices of violation for his sites.

Mr. FRELINGHUYSEN. So you have the ability—whatever is happening out in Washington State, are you going to be licensing this facility, which is—

Mr. ECKROADE. Right, so they can operate.

Mr. FRELINGHUYSEN. Yeah. I mean, you are going to provide the ground, the legal ground for its operation?

Mr. ECKROADE. Well, our role will be to assess key aspects of safety and advise the senior line managers and the Secretary of our concerns about the safety of that facility. If we find violations of our safety requirements, we take an enforcement—

Mr. FRELINGHUYSEN. Well, I hope there is some nexus between some of the observations of the GAO to what you are doing.

Mr. TRIMBLE. Yes, sir.

Mr. FRELINGHUYSEN. And on behalf of Ms. Kaptur and all the members of the Committee, I want to thank each of you for your testimony today. It has been valuable. We appreciate it. We stand adjourned. Thank you.

**QUESTIONS FOR THE RECORD**  
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT  
HOUSE COMMITTEE ON APPROPRIATIONS

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**DEPARTMENT OF ENERGY'S MAJOR CONSTRUCTION PROJECTS**

**MARCH 20, 2013**

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**DOE PROJECT MANAGEMENT POLICY AND REFORMS****DELIVERING PROJECTS ON TIME AND ON BUDGET – DOE, EM,  
NNSA**

The Department of Energy revised its project management guidance three years ago to formalize its requirements and drive improvements in project management. And the people we have here today in this first panel are some of the very people that worked very hard on the revisions.

What were the primary improvements that you put into place when you revised this order?

What has revising this process done for the Department?

Ultimately, the goal of revising the policy and other reforms is to begin delivering projects on time and budget. In the latest report, 8 of 15 active EM projects had an unacceptable status, representing \$14 billion in costs. 3 of the 14 active NNSA projects were considered unacceptable representing \$5 billion in costs, not counting the Uranium Processing Facility because it is still in design but we know that project also has some problems.

Is DOE satisfied with these statistics? Do you think you've seen improvements - are there fewer projects 'in the red' than there were in that past?

What do you think will make the most difference in changing the downward trend of performance on each of the major projects - WTP, Salt Waste, UPF and MOX?

What should NNSA and EM focus on the most to get real performance improvements on its major projects?

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## WITHHOLDING CONTRACTOR FEE – EM AND NNSA

NNSA and EM have only recently demonstrated a willingness to exercise options available in its existing contracts to hold back contractor fees. In some cases, you have even asked for a return of fees already awarded.

Can you speak more on how NNSA and EM have used its authority to award fee?

How do you think this will lead to better performance in the future?

There seems to be some inconsistencies in how this new policy is being applied. The GAO recently criticized NNSA for overriding the award of incentive fees this year to Los Alamos and Lawrence Livermore.

Do you agree with the GAO that this policy will only work if it is consistently applied and there is a clear expectation by the contractor that they will be penalized?

Are you going to develop a specific policy to clarify expectations on how you will exercise this authority?

The Committee received information from DOE that there had been \$17 million in unearned fee for MOX Services in FY11.

Can you confirm that you have held back fee on the MOX project?

What happens to the fees for MOX or other projects that you've held back or recovered? Does the program use this funding for other costs?

Shouldn't this funding be returned to the taxpayer? Is there any reason why Congress should not rescind fees that were appropriated by ultimately not awarded to contractors?

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INEFFECTIVE PROJECT OVERSIGHT AND MONITORING PROJECT  
PERFORMANCE - DOE, EM, NNSA

Often, the data used by DOE managers to track progress on projects is not accurate because it has not been updated by the contractor. For instance, in the latest DOE project status report, it states the data for the Waste Treatment Plant does not “accurately represent the project’s performance due to ongoing re-baselining efforts, the suspension of some...reporting requirements, and [the contractor’s] approach to managing the baseline.”

Are there any contract requirements for projects to provide the updated and accurate data so that performance can be tracked, and are those requirements being followed?

Do EM and NNSA contractors consistently provide quality data on how the projects are performing? On which EM and NNSA projects is accurate performance data not being reported and tracked?

How can you get better data so that DOE managers aren’t left relying on the word of their contractor on how a project is progressing? Are there existing contract mechanisms you can use?

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## EM RECOVERY ACT PROJECTS AND LESSONS LEARNED

Mr. Surash, the GAO recently concluded its review of the EM recovery act cleanup projects and reported some positive results. This Committee asked you to take a look at the lessons that were learned and how you would apply those lessons to ongoing and future projects.

What was most successful and why?

What made these projects more consistently successful than other EM projects?

You were required to provide regular performance updates. Were the additional reporting and transparency requirements a factor?

Have you made any changes to the way you are doing business?

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**COST ESTIMATING****COMPETING COST ESTIMATES FOR UPF**

Mr. Bosco, in 2011, GAO recommended that DOE include specific guidance for reconciling differences, if any, between the results of independent cost estimates and other project cost estimates. Soon after, DOE released a new cost estimating guide and there is only a single paragraph to address the issue.

Has DOE satisfied the GAO's recommendation?

What can be done to resolve differences in cost estimates? Which estimates should the programs use and Congress believe?

Will DOE provide any additional guidance on how to resolve differences in cost estimates?

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## COST ESTIMATING CAPABILITIES OF THE DEPARTMENT

Mr. Bosco, significant efforts have been made to improve the quality of cost estimates conducted for DOE projects, particularly at the federal level. In 2011, DOE released a cost estimating guide to provide uniform guidance and best practices for preparing cost estimates by contractors and project teams.

Do we now have the level of expertise necessary within the Department to conduct independent cost estimates to verify the estimates developed by project teams and contractors?

How do you typically perform independent cost estimates and are you satisfied that they are being effectively conducted?

What additional improvements could be made? Does DOE need more in-house federal capabilities or can it use the services of independent contractors?

Is the quality of contractor's cost estimates improving knowing their estimates will be independently verified? Or are some contractors lagging?

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AUTHORITIES FOR ENFORCING COST ESTIMATING  
REQUIREMENTS

Mr. Bosco, one of the GAO recommendations for improving cost estimating was that the independent cost-estimating office should report directly to the Secretary and Deputy Secretary.

Have you found that your office, which reports to the director of the Office of Management, has sufficient authority within the Department to speak out on project management issues?

Is APM able to influence project reviews and the award of critical decisions to make sure requirements are being followed?

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## MANAGING SUBPROJECTS AND OPERATING PROJECTS

### STARTING CONSTRUCTION ACTIVITIES ON UPF

Mr. Raines, NNSA has requested to begin the road relocation and the realignment of the perimeter fence at Y-12 in FY13 under the Uranium Processing Facility project, without a performance baseline for the UPF project. According to the DOE's project management order, construction activities are approved at critical decision-3 only after setting the performance baseline at critical decision-2.

The NNSA's FY12 budget request also stated NNSA wanted to begin early site preparation for the CMRR-Nuclear Facility – funding which would have been wasted given the project's deferral in the FY13 budget request.

How is this subproject process addressed in the DOE order on project management and capital acquisition?

Can you discuss specifically what related construction activities you plan to start before finalizing the performance baseline on UPF?

Are you still committed to holding back site preparation until 90% design complete and on facility construction until a baseline has been established on UPF?

NNSA also requested to start early site activities on a very small \$100 million TRU waste project for Los Alamos in FY12. Do you plan on requesting funding to start early construction for every new NNSA project?

Why should the Committee allow DOE to start breaking ground on projects where you have provided no commitments for overall cost and schedule for completing the project?

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## COST GROWTH AND SETTING A NEW PERFORMANCE BASELINE

Mr. Surash, the Committee approved a reprogramming request this year to continue work on the Salt Waste project, but DOE provided very little information about what to expect of the ultimate costs. This not the only project that DOE is continuing to fund while it works to complete new baseline cost and schedules. You have also started this process for the WTP.

Can you explain how the baseline change process is supposed to work?

How long is the DOE's baseline change process supposed to take?

Do you think that it is acceptable to continue to manage projects without an accurate performance baseline for extended periods of time? How will you monitor project performance in the meantime?

Are you aware that the 2002 National Defense Authorization Act established limits on how much that DOE may spend when the cost estimate for a project grows by more than 25%, unless the Department gives notice and wait to Congress? When does DOE plan on providing notice on the cost growth associated with Salt Waste and WTP projects?

Do you plan on waiting until this baseline change process is complete to provide any information on the cost growth associated with these projects and how DOE will manage that growth?

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## DIVIDING UP BIG PROJECTS INTO SMALLER PROJECTS

Mr. Surash, EM started an initiative in 2009 called the new management framework which divided cleanup activities into smaller discrete projects of shorter duration deemed easier to oversee and manage. After reviewing this initiative, the GAO recommended DOE should develop and issue a policy that clearly sets out the criteria with more specificity for reclassifying capital asset projects into smaller operations activities under \$10 million in value.

There is almost no transparency in the budget request on these projects that you've divided up. In FY13, the NNSA also began requesting more funding for recapitalization within its operating funds, but provided no details on costs or schedule for those projects.

When is it appropriate to fund capital projects using operating funds?

If you are going to expand the use of breaking up projects to get the total cost below the \$10 million threshold, how will you improve transparency?

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## MISCLASSIFYING CAPITAL PROJECTS

Mr. Surash, in a recent investigation, GAO stated in its report that EM has actually misclassified a number of capital asset projects as operation activity projects, with the result that projects are implemented without the appropriate project controls required by Order 413.3B and without being tracked by the Office of Acquisition and Project Management.

How are these projects being tracked by the Department? Are they being reported in the budget request?

Does APM monitor performance for these operating projects like it does for other projects?

Is DOE going to issue any guidance, as the GAO recommended to make sure that programs don't skirt project requirements?

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#### REPORTING MINOR CONSTRUCTION PROJECTS

Mr. Bosco, the Committee has set minor construction thresholds and has required the Department to produce an annual report listing all minor construction projects, or General Plant Projects, under \$10 million.

Who is responsible within the Department for preparing this report?

The Committee has never received a report and the budget requests typically contain very little information if any on general plant projects in the budget request. When does DOE plan on submitting this report?

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## CONTRACT MANAGEMENT

### CHOICE OF CONSTRUCTION CONTRACTOR

Mr. Raines, EM uses a variety of contractors and contract mechanisms to accomplish its work, but most NNSA construction projects are tasked to its M&O contractors who then subcontract the work out. The previous NNSA Administrator, Tom D'Agostino, had expressed a desire to directly contract more construction projects to builders, particularly the big projects.

The final combined Pantex/Y-12 contract did not specifically say that the contract to build UPF would be awarded separately. Will NNSA seek to contract separately for construction of UPF or other construction projects? Or is this idea no longer being considered by the NNSA?

If NNSA were to award the contract for UPF construction directly to a builder, would this save costs by avoiding the M&O's overhead rates? What are other benefits and drawbacks?

Does NNSA have the oversight capabilities to directly manage a major construction contract or even smaller firm fixed price contracts? How will NNSA improve its federal project management capabilities?

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#### INCREASING THE USE OF FIXED PRICE CONTRACTS

Mr. Raines, some contractors have stated that they would need the ability to earn higher fees as an incentive to accept the risk of entering into a firm fixed price contract with DOE.

Do you think that you will need to award higher fees for fixed price work to generate commercial interest?

What kind of projects or activities lend themselves to fixed price contracts without excessive fees to the contractor?

Are you doing any analysis to properly value the risk as assumed by the government or the contractor?

Are there other implications you need to take into account when choosing to use fixed price contracts? How will you track performance?

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**TRACKING PROJECT PERFORMANCE**

## TRACKING PROJECT PERFORMANCE

Mr. Bosco, the GAO has taken EM and NNSA off its high-risk list for projects less than \$750 million. But as recently as this past December, the GAO released another report saying that EM and NNSA project management of non-major projects still needs improvement. They found EM and NNSA did not properly document its performance targets at critical decision milestones so that performance against targets could be measured.

Is it a requirement of your DOE order that performance information is provided to the acquisition executive at each critical decision milestone?

How can DOE measure project performance if targets for performance are not being documented?

The Subcommittee is also aware there have been other poor project decisions that stem from awarding a critical decision too early. In the case of the Y-12 security upgrades project, the implications of putting that new system into operation before it was ready led to the degradation of the site's security posture.

Does the Office of Engineering and Construction Management or anyone else typically consult or intercede when acquisition executives approve milestones that do not meet requirements in the DOE orders?

How does DOE ensure its acquisition executives do not repeat mistakes and understand the importance of following project management guidelines?

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## TRACKING PROGRESS WHILE IN DESIGN STAGES

Mr. Bosco, while there is performance information available for projects that have set a performance baseline, it is not clear how DOE programs are tracking progress on projects that are in the design stage. Now that DOE is waiting until 90% design complete to set a baseline, these projects will spend a longer period of time in this early phase. There are hundreds of millions of dollars being requested for projects without a baseline and there is no clear performance metric for delivering a design and baseline on time and on schedule.

What specifically are the requirements for projects while in the pre-Critical Decision 2 design phase? Are these projects being tracked in any systematic way by DOE?

Shouldn't there be some sort of commitment for delivering a design and baseline on time and on budget?

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**POOR DESIGN WORK FOR THE URANIUM PROCESSING FACILITY**

Mr. Raines, last year, Tom D'Agostino testified that he did not expect the UPF to exceed the then cost range of \$4.2 to \$6.5 billion. Since then, we have learned that the UPF will cost even more because NNSA discovered late in the game that the building needs to be larger, requiring NNSA to go back and redesign parts of the facility.

We've invested hundreds of millions for the design of that facility – how did this happen? Why did it take so long for NNSA to realize the building's construction was faulty?

What is being done to get this project back on track and prevent costs from rising further?

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# MANAGING CHANGE ORDERS - NUMMSUP SECURITY UPGRADES

Mr. Raines, The Subcommittee has been provided information on the NMSSUP and other construction projects that indicate federal managers were unaware of project costs that were being incurred because contractors were not processing change orders in a timely fashion.

Why, particularly for an M&O contractor that is paid on a cost plus basis, are these changes not being processed in a timely manner?

How can NNSA or the contractor manage a project with outstanding, in one case 1,600, change orders?

What is the extent of this problem within NNSA and EM? What are you doing to address the issue?

For the NMSSUP project, why exactly did you stop all work in October 2012? Did the NNSA take action to prevent exceeding its spending authority and did the contractor overspend?

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## HUMAN CAPITAL

### STATE OF NUCLEAR INDUSTRY AND THE WORKFORCE

Mr. Raines, NNSA has reported difficulties its contractors have experienced finding and retaining a skilled craft workforce that can produce work at the high quality standards that a nuclear facility requires. In order to build the Salt Waste Processing Facility and the MOX plant, contractors have had to build a craft workforce from scratch at times, offering training to build such skills as welding for nuclear applications. But DOE says that only so many workers are making it through these training programs, and those that do are in high demand and are being drawn to higher wages at other projects. NNSA has also requested significant sums in its budget request to train its contractor workforce overseas in France to support the MOX plant.

Is retention and recruitment of craft labor a major problem? What is being done, if anything, to actively manage this problem?

Are there mechanisms DOE can build into contracts to require an employee that we've trained to make sure they don't run off to another higher paying job six months down the road? Isn't that a reasonable demand to make in exchange for paid on-the-job skills training?

The existence of a capable workforce is a major reason why the government selects a particular contractor to carry out work. Should DOE formalize and enforce workforce retention requirements through contract mechanisms?

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CONTRACTOR AND FEDERAL ACCOUNTABILITY

Mr. Raines, the NNSA Administrator testified that one of the actions NNSA is taking is to demand the highest quality people from its contractors. These are quality, world class companies who have a variety of talented personnel available to them, presumably the very reason NNSA has contracted with such companies.

Why do you think that contractors are not delivering results for you when they can deliver for other clients?

If you've seen benefits from changing out project leadership on the contractor side, why aren't you doing the same thing on the federal side?

Are project managers and site office personnel regularly reassigned when projects are not performing?

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**NUCLEAR DESIGN, SAFETY AND QUALITY CONTROL****FIRST-OF-A-KIND NUCLEAR FACILITIES – EM AND NNSA**

Many of the performance problems on the major projects have been attributed to the fact that these facilities are so-called first-of-a-kind facilities. The GAO identified that about half of the \$1 billion in cost increases for the National Ignition Facility were because “incorrect assumptions were made about the amount of work necessary to integrate the technologies and assemble the components.” We are now hearing reports that the same thing has happened at the MOX plant, that the NNSA simply underestimated the amount of work it would take to adapt the designs of individual equipment and components to DOE’s nuclear quality standards.

How does DOE make sure that process and equipment development is properly managed as part of a major project? Does the Department do anything to actively track and oversee development work associated with its projects, or does it primarily rely on its contractors to perform this task?

Is there any formal guidance DOE follows to ensure that equipment and processes are sufficiently mature before you set a baseline?

Is there a risk mitigation plan being developed or other actions being taken to quantify the risks and oversee development work associated with the WTP, UPF and MOX projects?

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CONTENTIOUS RELATIONSHIP WITH THE DEFENSE NUCLEAR  
FACILITIES SAFETY BOARD (DNFSB) – EM AND NNSA

This Committee has noted the sometimes contentious relationship that programs within the Department of Energy have had with the Defense Nuclear Facilities Safety Board. It is clear that some delays and cost increases are being incurred because of delayed response to DNFSB concerns. DOE has not quantified the costs we have incurred while continuing to construct the Waste Treatment Plant before fully resolving the significant nuclear safety issues identified by the DNFSB.

Could DOE save costs on projects by engaging the DNFSB earlier?

Should DOE project guidance incorporate some sort of acknowledgement of the DNFSB's role?

What further steps can be taken to get the DNFSB involved earlier in the project design process, as well as make sure that DOE managers have acted appropriately to any recommendations received?

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**GOVERNMENT ACCOUNTABILITY OFFICE (GAO)****NUCLEAR SUPPLIERS**

Subcommittee. Mr. Trimble, the NNSA and EM have reported that progress on their one-of-a-kind nuclear facility is so poor because of the lack of availability of vendors who can produce at the higher NQA-1 nuclear quality standards.

Has the GAO found any indications that DOE recognizes this problem and has taken action to manage the problem?

Mr. Trimble. We found evidence that DOE has been aware of this problem. For example, DOE included a contract provision that requires the contractor for the construction of the MOX Fuel Fabrication Facility to continuously monitor market conditions to identify factors that may affect cost or schedule. The MOX contractor submitted an initial market analysis report in 2006, which identified cost pressures, including a shortage of nuclear-qualified suppliers. However, the report did not make any recommendations on how to address these cost pressures, and the contractor did not submit semiannual market report updates required under the contract. It is not clear whether DOE took any action to enforce this contract provision.

In addition, the Energy Facility Contractors Group (EFCOG), an organization of major contractor companies that manage DOE's facilities, published a white paper in December 2011 on the shortage of qualified suppliers. The paper stated that the shortage of qualified or experienced suppliers had reduced competition on DOE projects, increasing costs and delaying project completions—particularly on projects requiring compliance with nuclear quality assurance (NQA-1) standards. The white paper also made recommendations to address this problem. However, we have not evaluated these findings or the impact of any actions DOE may have taken in response to these recommendations.

Subcommittee. How do DOE contractors typically address the problem, and which actions have been most effective? For instance, do contractors often send personnel out to vendors to ensure critical path procurements are delivered on time?

Mr. Trimble. We have not evaluated how contractors typically address the problem or the effectiveness of contractors' efforts. In the instance of the MOX facility construction, we learned that the MOX contractor sends personnel out to vendors to help them with their NQA-1 program, and also uses other vendors without an NQA-1 quality program, but who must undergo additional inspections of their facilities and additional reviews to verify the adequacy of their programs.

## GAO RECOMMENDATIONS ON THE WASTE TREATMENT PLANT

Subcommittee. Mr. Trimble, the GAO released the results of a recent investigation it conducted on the Hanford Waste Treatment Plant in December. In that report, GAO recommended that DOE not resume construction on the Pretreatment and High-Level Waste facilities. DOE announced in January, it would restart some work on those facilities.

Why does the GAO recommend not restarting work, particularly since DOE has legal obligations to complete the facility on time?

Mr. Trimble. WTP engineers and scientists have not yet resolved several complex technical issues associated with the project, and restarting construction work without resolving these issues could lead to additional cost and schedule delays. In December 2012, we reported that the estimated cost to construct the WTP has tripled to \$13.4 billion since the project began, and its scheduled completion date has slipped by nearly a decade to 2019.<sup>1</sup> It is our view that the primary reason for these cost increases and schedule delays is DOE's decision to build what the department describes as the world's largest and most complex nuclear waste treatment plant using a fast-track, design-build strategy that is more appropriate for much simpler, smaller scale construction projects. Nuclear industry guidelines suggest completing 90 percent of design prior to beginning construction. DOE instead began construction of this facility when its design was in the early stages and continued designing the facility and developing new technologies while construction was ongoing. The result has been significant rework, and some parts of the plant may need to be dismantled and re-fabricated. Significant cost increases and schedule delays are likely to persist if DOE continues with construction while these technical challenges remain. In addition, DOE has directed the contractor to develop a new cost and schedule baseline for the project and to begin a study of alternatives that include potential changes to the WTP's design and operational plans.

Subcommittee. What are the implications for restarting work?

Mr. Trimble. As we have previously reported, technical challenges could lead to billions of dollars in additional cost increases and prolong schedule delays. DOE has no assurance that work will not have to be re-

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<sup>1</sup> GAO, *Hanford Waste Treatment Plant: DOE Needs to Take Action to Resolve Technical and Management Challenges*, GAO-13-38 (Washington, D.C.: Dec. 2012).



done until technical issues are resolved, critical technologies are tested and verified as effective, and the facility's design has been completed to the level established by nuclear industry guidelines.

Subcommittee. Has GAO reviewed the scope of the work that was restarted in January? Are any of those activities work that the GAO has recommended should not go forward?

Mr. Trimble. We have not reviewed the scope of the work at WTP that DOE restarted in January 2013. In a written response to our December 2012 report, DOE stated that it had already taken action that is aligned with one of our recommendations. Specifically, in August 2012, DOE directed the contractor to address remaining WTP technical and management issues sufficient to produce a high-confidence design and baseline for the pretreatment and high-level waste facilities of the WTP. In addition, it established a limited construction activity list for the high-level waste facility, as well as a much more limited set of construction activities in the pretreatment facility, allowing the contractor to complete construction of some portions of the facilities while taking into account the unresolved technical issues.

More recently, showing continued support of this position, in a March 20, 2013 hearing statement before this Subcommittee, DOE stated that it is focused on resolving the technical issues with the pretreatment facility and the high-level waste facility in order to produce a high-confidence design and baseline for these facilities before resuming full construction activities. It is worth noting that, while DOE seeks to resolve technical issues at WTP, it is not clear whether DOE will follow best practices in assessing these technical issues as it decides when to resume construction. Specifically, while industry best practices, including for the Department of Defense and the National Aeronautics and Space Administration, is to not proceed to construction until technical readiness level of seven is achieved, DOE's guidance allows construction to proceed at the technical readiness level of six.

## GAO RECOMMENDATIONS ON AWARDING CONTRACTOR FEE

Subcommittee. Mr. Trimble, Also in the WTP report, the GAO recommended that DOE ensure the contractor performance evaluation process does not prematurely reward contractors for resolving technical issues later found to be unresolved and to take appropriate steps to determine whether any incentive payments were made erroneously and, if so, take actions to recover them. NNSA and EM have discussed actions they have been taking to make their policies for awarding fee more effective.

Do you think NNSA and EM are making effective use of available contract mechanisms or at least headed in the right direction?

Mr. Trimble. As stated in our March 20 testimony before this subcommittee, neither NNSA nor EM has a major project that can demonstrate the impact of DOE's recent reforms to meet cost and schedule targets.<sup>2</sup> Such DOE reforms include those described by the Director of DOE's Office of Acquisition and Project Management during the testimony, such as including provisional fee clauses in contracts that would allow DOE to recover interim fees paid to a contractor over the course of a project if the project is not ultimately delivered within cost and schedule targets. We will continue to monitor and evaluate DOE's implementation of these reforms.

Subcommittee. What more can be done?

Is this simply a matter of changing the way contract mechanisms are exercised?

Can project performance improve without reforming the way DOE contracts are actually structured?

Mr. Trimble. The challenges DOE faces in improving its project and contract management include more than just changing how contract mechanisms are exercised. We have documented the problems with DOE's management of projects for over 30 years. In 2008, DOE assessed and ranked what it considered the root causes of these problems. These causes were broader than how contract mechanisms are exercised and included poor upfront planning, the absence of a DOE policy on cost estimating, not

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<sup>2</sup> GAO, *Department of Energy: Concerns with Major Construction Projects at the Office of Environmental Management and NNSA*, GAO-13-484T (Washington, D.C.: March 20, 2013).

identifying risks, and basing estimates on unrealistic assumptions. Notwithstanding DOE's own analysis as well as numerous GAO, DOE Inspector General and National Research Council reports, DOE has not consistently acted to address these root causes. For example, DOE continues to not have a cost estimating policy, although its own analysis and GAO recommended one be implemented. Similarly, DOE identified poor upfront planning and unrealistic assumptions as key root causes, but it has not implemented our recommendation that it conduct an independent cost estimate earlier in the process of a project, at critical decision 1. Notably, DOE had agreed to implement this recommendation.

## DOE MANAGEMENT STRUCTURE RECOMMENDATIONS

Subcommittee. Could you make any recommendations on the management structure within DOE to accomplish its project goals within the proposed budget? Is DOE properly organized internally and does it have internal discipline to accomplish the task at hand?

Mr. Trimble. As we testified in June 2012, we do not believe that there is a need for drastic changes to the management structure within DOE, such as removing NNSA from DOE and either moving it to another department or establishing it as a separate agency.<sup>3</sup> In addition, as discussed in our February 2013 High-Risk update, DOE has demonstrated strong commitment and top leadership support for improving contract and project management in EM and NNSA, the two DOE program elements that are the focus of our high-risk designation of contract management at the department.<sup>4</sup>

However, as noted in section 3 above, DOE has not taken consistent or effective action to address the root causes of its long-standing project management problems. For example, in January 2010, we found that DOE did not have a cost-estimating policy and that cost-estimating guidance it had developed in the 1990s remained in effect but was out-of-date.<sup>5</sup> We also found that DOE was taking steps to improve its cost-estimating practices, such as establishing the Office of Cost Analysis (OCA) in 2008 to improve cost-estimating capabilities and better ensure that project cost estimates are reliable by providing a new independent cost-estimating function. On May 8, 2013, we testified on preliminary observations from an ongoing review of DOE's cost-estimating practices which indicate that while DOE followed through on some of our January 2010 recommendations—such as revising the department's project management order to better align it with some cost-estimating best practices—it has not addressed other recommendations with which it initially concurred.<sup>6</sup> For example, our preliminary observations indicate that OCA has been disbanded, and that DOE may not have developed a cost-estimating policy.

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<sup>3</sup>GAO, *Modernizing the Nuclear Security Enterprise: Observations on the Organization and Management of the National Nuclear Security Administration*, GAO-12-867T (Washington, D.C.: June 27, 2012).

<sup>4</sup>GAO, *High-Risk Series: An Update*, GAO-13-283 (Washington, D.C.: Feb. 2013).

<sup>5</sup>GAO, *Department of Energy: Actions Needed to Develop High-Quality Cost Estimates for Construction and Environmental Cleanup Projects*, GAO-10-199 (Washington, D.C.: Jan. 14, 2010).

<sup>6</sup>GAO, *Department of Energy: Observations on Project and Program Cost Estimating in NNSA and the Office of Environmental Management*, GAO-13-510T (Washington, D.C.: May 8, 2013).

**ARMY CORPS OF ENGINEERS****CORPS ESTIMATE FOR THE URANIUM PROCESSING FACILITY**

Subcommittee. Mr. Ferguson, a few years ago the Corps of Engineers, at the request of the NNSA, completed a cost estimate of the Uranium Processing Facility.

When the Corps did its estimate of UPF, how different was your estimate from the contractor's estimate?

Mr. Ferguson. The 2010 Corps Independent Cost Estimate (ICE) for UPF totaled \$7.386 billion at the 85% Confidence Level (CL) which assumed an unconstrained funding stream. The 2010 M&O Contractor's estimate provided a range of \$4.2 billion (50% CL) to \$5.5 billion (High Range) with NNSA Programmatic Risk to be determined. The Corps Reconciled ICE was \$6.836 billion (85% CL) and the NNSA Range was \$4.2 to \$6.5 billion including both contractor and federal contingencies.

Subcommittee. How much cost data was available from the contractor and what was the quality of that cost data? In your opinion, do DOE contractors collect and track enough information on their costs?

Mr. Ferguson. During the reconciliation, the M&O provided the Corps with its detailed cost estimate for review. For construction task estimating, the M&O used historical unit rates from past similar projects adjusted for the UPF project. The Corps obtained little additional detail supporting the historical unit prices, i.e. - \$/unit of measure, in order to determine reasonableness and how the historical unit prices were factored to fit the UPF project. Most successful DOE contractors adequately collect and track actual project cost data. The challenge with reviewing such historical cost data for the Corps during reconciliation was primarily a function of traceability into the details and access to detailed info and documentation which Contractors may consider proprietary.

Subcommittee. What different capabilities did the Corps bring to the table? How do your cost estimating methods differ from methods used by DOE?

Mr. Ferguson. The Corps team consisted of a diverse and experienced team of project managers, cost engineers, schedulers, risk analysts, and subject matter experts. The team was organized according to the UPF 10 respective Functional & Process Areas. The Corps primarily used a detailed bottoms-up estimating approach for the construction tasks whereas the M&O used historical unit prices adjusted or factored for the UPF project. A variety of other best practice estimating methodologies were used for project management, design and engineering of the project including level-of-effort, historical costing, algorithms, etc.

Subcommittee. What are the primary drivers of the total cost in the UPF? Did you identify to NNSA which assumptions the estimate was most sensitive to? In other words, what were the uncertainties that could potentially lead to cost overruns?

Mr. Ferguson. The Corps performed a detailed cost and schedule risk analysis (CSRA) of the UPF project. The CSRA determined appropriate contingency assignment for cost and schedule which was communicated to NNSA. The largest cost and schedule risk drivers in descending order of impact were: 1) Funding Stream Availability; 2) Loss of Building 9212 Capability; 3) Pre-Operational Testing; and 4) New Technology Readiness.

Subcommittee. One of the reasons NNSA says its cost estimate has increased for the UPF is that it has added billions of dollars in additional contingency to the base estimate.

Roughly speaking, what amount of contingency should be added to the baseline estimate? What considerations should be taken into account when deciding project contingency? Are there any industry guidelines?

Mr. Ferguson. Reasonable contingencies are developed by identifying and analyzing each project specific risk typically captured in a "risk register." A reasonable confidence level (CL) to select from the monte-carlo risk simulation is 80% for a reasonable chance of project success. The contingency value at 80% CL can range widely depending on a project's design maturity and unique risks and their likelihood of occurrence and impact to the project for cost and schedule (10-100% or more of point estimate or schedule. The following risk factors should be considered in modeling risks and determining reasonable contingencies: 1) level of design maturity; 2) acquisition strategy; 3) technology readiness levels; 4) labor

market and equipment availability; 5) fuel price variations; 6) material availability and pricing; 7) seismic design considerations; and 8) funding stream constraints. The Corps cost and schedule risk analysis (CSRA) methodology is considered best practice within the broader federal and industry cost engineering community of practice. The recent design effort to resolve the “space/fit” challenge has utilized approximately 71% of the UPF NNSA Federal Contingency at the 85% CL.

USE OF ARMY CORPS OF ENGINEERS FOR PROJECT  
MANAGEMENT REFORMS

Subcommittee. Mr. Ferguson, three years ago, in response to GAO's concern that the Department does not have adequate staffing, DOE stated a desire to use its contract with the Corps of Engineers to access more project management and cost estimating expertise.

What kind of support has the Corps given to NNSA and EM over the past three years?

Mr. Ferguson.

1. Cost Engineering (independent cost estimates, schedules, risk analysis, & project controls) for EM, NNSA and DOE-APM
2. Project Peer Review Support for EM on multiple projects
3. Project Management Partnership for EM
4. Construction Management

For NNSA

- UPF Bear Creek Road Site Prep & Readiness (Corps Nashville & Huntington Districts)
- High Explosives Processing Facility (Corps Tulsa District)



## CONTRACT ACQUISITION STRATEGY

Subcommittee. Mr. Ferguson, large projects like the ones being managed by DOE may only have a handful of contractors that are capable of performing the work and/or willing to take on the risk of a firm-fixed-price contract. This limits competition, which may drive up the cost. Most DOE contracts are cost reimbursable contracts, which may also have cost implications.

Given what you know about DOE projects, do you believe the concern about limited competition for DOE construction work is warranted? Has the Corps experienced any issues in finding capable contractors for the fixed-price work DOE has contracted through the Corps?

Mr. Ferguson. Limited competition continues to be a valid concern on large DOE projects for which the scopes are technically complex; include designs and processes which involve handling radionuclides; and/or unique projects, where the design and technology is not fully developed. The Corps has not experienced problems in regard to finding capable contractors willing to perform DOE fixed-price work for the few construction contracts which it solicited for DOE.

Subcommittee. Should it be assumed that DOE will need to offer higher incentive fees to attract a greater number of contractors to execute DOE work using firm-fixed-price contracts?

Mr. Ferguson. Firm fixed price contracts transfer greater risk to contractors and thus associated fees (profit) will typically be greater than fee for a cost reimbursable contract vehicle where the government owns greater risk.

Subcommittee. What else could DOE do to attract capable contractors that would be willing to bid on the majority of the work as a firm-fixed-price contract?

Mr. Ferguson. The key to successful firm fixed price contracting on DOE projects is developing a complete solicitation package (plans and specifications) which are clear to prospective bidders and/or have specific performance requirements which are completely within the contractor's control. These contracts are perceived as low-risk to accomplish. Another

successful strategy for DOE to consider would be to de-aggregate larger projects into smaller design/construction packages or “phases” for fixed-price contracting where it makes sense.

Subcommittee. If DOE is stuck with contracting using cost reimbursable contracts, what additional controls can be used to incentivize contractors to perform work efficiently and to avoid cost overruns?

Mr. Ferguson. DOE has a good understanding of both the construct and administration of their cost contracts. Many of their cost and schedule overruns are due to redesign and other impacts which are typical of large projects which span many years and budget cycles – they also have been severely impacted by changes in disposal decisions which are outside the control of the contractor or the site. If DOE could de-aggregate the work into several contracts with more near-term performance targets, they could make better use of their cost reimbursable contracts. They might also choose to convert cost reimbursable contracts to firm fixed-price as the design matures on either portions or all of a project.

**DOE OFFICE OF HEALTH, SAFETY AND SECURITY (HSS)****LICENSING A DOE FACILITY FOR NUCLEAR SAFETY**

Mr. Eckroade, the NRC licenses commercial nuclear facilities. The decision was made not to seek NRC license for Waste Treatment Plant (WTP), but for DOE to license the facility according to DOE's defense nuclear facility standards. The Office of HSS is the gatekeeper of those standards and performs independent safety and security oversight of the programs. It also enforces the nuclear safety regulations.

How does DOE effectively 'license' a nuclear facility and ensure that it will operate safely?

It has taken the NRC several years and they have several hundred engineers developing the processes to license new reactors. HSS is a small organization. Does HSS have the capabilities to do that, to effectively oversee the license for the WTP and the other nuclear facilities and ensure they can be safely operated?

HSS has no line authority to enforce standards on these projects, so what enforcement mechanisms does HSS have?

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HEALTH, SAFETY AND SECURITY (HSS) REVIEW OF NUCLEAR  
SAFETY CULTURE

Mr. Eckroade, in FY12, after hearing of concerns that the nuclear safety culture on the Waste Treatment Plant (WTP) had deteriorated, the Committee directed the Secretary of Energy to perform a safety culture review of the major construction projects. We understand HSS took this direction seriously and actually expanded the review to other sites.

What did HSS find at the Waste Treatment Plant, Uranium Processing Facility and the major projects in particular?

Why is a good nuclear safety culture important?

Is it possible that the cultural climate at a site or on a project impede progress on the project? Has a poor safety culture impeded progress on any DOE projects?

Is it reasonable to link the findings of a poor safety culture to the EM's program's difficulties in resolving technical safety issues at WTP?

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## CONTRACT STRUCTURES AND SAFETY CULTURE

Mr. Eckroade, one of the aspects of the WTP safety culture problem found by the Defense Nuclear Facilities Safety Board that the Committee is particularly concerned about is whether the contract incentives were structured in such a way so as to contribute to the deterioration of the safety culture. Specifically, the EM structure had linked specific fee amounts to resolution of some very difficult technical design problems, issues it will probably take the Department significant amounts of funding and years to truly resolve.

Did DOE link the award of the contractor's at-risk fee to the technical resolution of nuclear safety design issues on the WTP project? Is this common contracting practice at DOE?

When fee is at stake, could the contract structure provide an incentive for contractors to prematurely call a design issue resolved in order to satisfy the terms of its contract and earn fee? Is this an appropriate fee structure when nuclear safety is at stake?

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